2012

Forensic use of DNA information: human rights, privacy and other challenges

Khaleda Parven

University of Wollongong

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CERTIFICATION

I, Khaleda Parven, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Faculty of Law, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Khaleda Parven
January 2012
ABSTRACT

Science and technology has developed considerably and discovered lots of new ideas for the benefit of humankind. The advancement of DNA technology has contributed significantly to various fields. Forensic use of DNA information has great potential to assist in the delivery of justice. At the same time ‘human rights and privacy violations’ as well as ‘other challenges’ that exist in relation to its use cannot be ignored. Therefore the forensic use of genetic information has created two major mutually dependent yet sometimes opposing contexts — one is ensuring justice by protecting public interest and security, and the other is protecting human rights and privacy of the data subject.

This thesis, therefore, explores the implications of one of the most successful (yet not universally accepted or uncontroversial) developments of science and technology: the forensic use of DNA information in the justice delivery system. The thesis examines the issue via two case studies, one of the National DNA database (NDNAD) of the UK, and the other of the National Forensic DNA Profiling Laboratory (NFDPL) of Bangladesh, representing developed and developing countries respectively. These case studies reveal the intentions of governments in the use of the technology and the establishment of the associated databases. The views of ordinary people regarding emerging challenges are also canvassed both in the context of the developed and developing countries. More specifically, the thesis addresses the following central questions: ‘Are there any human rights and privacy violations?’; ‘To what extent are developing countries concerned about the issues of human rights and genetic privacy violations?’; and ‘How can any gaps between developed and developing countries be minimised?’ It also considers whether the international community is considering these issues as emerging threats to sustainable development, the enforcement of justice, and to international human rights norms.

The main argument developed in this thesis is that there is some scope for human rights and privacy violations while using human DNA data for the justice delivery purposes, though the nature and scope of such violations differ to some extent depending upon the DNA facility selected (that is, the NDNAD or the NFDPL).
Some financial-technological and administrative challenges are also revealed by the analysis of these case studies. Findings in this thesis suggest that since both the forensic use of DNA information is vital for detecting criminals and exonerating the innocent; however, at the same time, such use should not compromise human rights and privacy protection. Taking an ‘absolute’ approach to combating crime or to maintaining human rights in that context is fruitless. Neither one nor the other can prevail absolutely and to the detriment of the other. Time and again, it is a question of ‘balance’ or ‘proportionality’. In such a situation, the present study makes a number of specific recommendations in regard to encouraging and reinforcing the proper utilisation of genetic information in the justice delivery system. Among these recommendations, the author of this thesis considered that the confidence of data subject in the system is crucial; this is because a trustworthy system helps ensure justice and enhances social harmony. The possible solutions to these human rights and other challenges (such as resource levels and so on), of course, depend on the country context, as well as political will and/or policy of the government. Governments and the international community should consider all these factors when looking at and making recommendations for the exploding growth of forensic use of DNA data and databases in the justice delivery system, and acting upon those recommendations.
ACKNOWLEDGEMENTS

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This work has benefited from various research organisations. My special appreciation goes to the Director and other staff of the Multi-Sectoral Programme on Violence Against Women (MSP-VAW), as well as the entire unit of the National Forensic DNA Profiling Laboratory, Bangladesh, for their time and cooperation in interviews and data collection. I am grateful to my friends and colleagues for encouraging me all the time and providing supports in a number of ways.

With a feeling of my highest respect, I would like to pay the richest tributes to the memory, life and work of my father, who passed away. My limitless gratitude to my mother who always hides her pains for my joys even at her age.
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<tr>
<th>Acronym</th>
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<td>ACPO</td>
<td>Association of Chief Police Officers</td>
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<td>AD</td>
<td>Appellate Division</td>
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<td>ALRC</td>
<td>Australian Law Reform Commission</td>
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<td>APA</td>
<td>Association of Police Authorities</td>
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<td>ASN</td>
<td>Arrestee Summons Number</td>
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<td>BDT</td>
<td>Bangladeshi Taka</td>
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<tr>
<td>BTRC</td>
<td>Bangladesh Telecommunication Regulatory Commission</td>
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<tr>
<td>CAQDAS</td>
<td>Computer-Assisted Qualitative Data Analysis Software</td>
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<td>CODIS</td>
<td>Combined DNA Index System</td>
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<tr>
<td>CJPOA</td>
<td>Criminal Justice and Public Order Act</td>
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<td>CJPA</td>
<td>Criminal Justice and Police Act</td>
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<td>CJA</td>
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<td>CJ</td>
<td>Criminal Justice</td>
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<td>CTA</td>
<td>Counter Terrorism Act</td>
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<td>CDFD</td>
<td>Centre for DNA Fingerprinting and Diagnostics</td>
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<td>DANIDA</td>
<td>Danish International Development Agency</td>
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<td>DNA</td>
<td>Deoxyribonucleic Acid</td>
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<td>DEB</td>
<td>DNA Executive Board</td>
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<td>DZ</td>
<td>Dizygotic</td>
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<td>DHHS</td>
<td>Department of Health and Human Services</td>
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<td>EU</td>
<td>European Union</td>
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<td>ECtHR</td>
<td>European Court of Human Rights</td>
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<td>European DNA Profiling Group</td>
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<td>European Convention for the Protection of Human Rights</td>
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<td>ECOSOC</td>
<td>Economic and Social Council</td>
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<td>ENFSI</td>
<td>European Network of Forensic Science Institutes</td>
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<td>FBI</td>
<td>Federal Bureau of Investigation</td>
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<td>FSS</td>
<td>Forensic Science Service</td>
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<td>FSR</td>
<td>Forensic Science Regulator</td>
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<td>GINA</td>
<td>Genetic Information Non-discrimination Act</td>
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<td>GovCo</td>
<td>Government-owned Contractor-operated</td>
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<td>GT</td>
<td>Grounded Theory</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<td>HCD</td>
<td>High Court Division</td>
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<td>Human Genetics Commission</td>
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<td>HIPAA</td>
<td>Health Insurance Portability and Accountability Act</td>
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<td>HLA</td>
<td>Human Leucocyte Antigen</td>
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<td>HSD</td>
<td>Health Sector Database</td>
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<td>Human Research Ethics Committee</td>
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<td>ICCPR</td>
<td>International Covenant on Civil and Political Rights</td>
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<td>ICESCR</td>
<td>International Covenant on Economic, Social and Cultural Rights</td>
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<td>ICO</td>
<td>Information Commissioner Office</td>
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<td>IDHGD</td>
<td>International Declaration on Human Genetic Data</td>
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<td>IO</td>
<td>Investigating Officer</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>INTERPOL</td>
<td>International Police Organization</td>
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<td>IBC</td>
<td>International Bio-ethics Committee</td>
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<td>IPP</td>
<td>Information Privacy Principles</td>
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<td>IVS</td>
<td>Intervening Sequence</td>
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<td>LDC</td>
<td>Least Developed Country</td>
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<td>LCN</td>
<td>low copy number</td>
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<td>MDH</td>
<td>Medical Director of Health</td>
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<td>MLP</td>
<td>Multi-locus Probe</td>
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<td>MtDNA</td>
<td>Mitochondrial DNA</td>
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<td>NPIA</td>
<td>National Policing Improvement Agency</td>
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<td>NDNADSB</td>
<td>National DNA Database Strategy Board</td>
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<td>NFDPL</td>
<td>National Forensic DNA Profiling Laboratory</td>
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<td>NDNAD</td>
<td>National DNA Database</td>
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<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
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<td>NPP</td>
<td>National Privacy Principles</td>
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<td>NCIDDD</td>
<td>National Criminal Investigation DNA Database</td>
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<tr>
<td>NSPCC</td>
<td>National Society for the Prevention of Cruelty to Children</td>
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<tr>
<td>OECD</td>
<td>Organisation of Economic Cooperation and Development</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>OCC</td>
<td>One-Stop Crisis Centre</td>
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<td>PIU</td>
<td>Project Implementation Unit</td>
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<td>PIS</td>
<td>Participation Information Sheet</td>
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<tr>
<td>PLA</td>
<td>Privacy Legislation Amendment</td>
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<td>PLS</td>
<td>Pendulum List Searching</td>
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<td>PD</td>
<td>Paternity Discrepancy</td>
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<td>PHI</td>
<td>Protected Health Information</td>
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<td>PACE</td>
<td>Police and Criminal Evidence</td>
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<td>PNC</td>
<td>Police National Computers</td>
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<td>PPP</td>
<td>Public-Private Partnership</td>
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<td>RFLP</td>
<td>Restriction Fragment Length Polymorphism</td>
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<td>SC</td>
<td>Supreme Court</td>
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<td>SGM</td>
<td>Second General Multiplex</td>
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<td>SLP</td>
<td>Single Locus Probe</td>
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<tr>
<td>SNP</td>
<td>Single-Nucleotide Polymorphism</td>
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<td>SOC</td>
<td>Scene of Crime</td>
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<td>SOCPA</td>
<td>Serious Organised Crime and Police Act</td>
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<td>STR</td>
<td>Short Tandem Repeat</td>
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<td>STADNAP</td>
<td>Standardisation of DNA Profiling in the European Union</td>
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<tr>
<td>TTT</td>
<td>Technical Teaching Team</td>
</tr>
<tr>
<td>TIGR</td>
<td>Institute for Genomic Research</td>
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<tr>
<td>UDHR</td>
<td>Universal Declaration of Human Rights</td>
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<tr>
<td>UDHGHR</td>
<td>Universal Declaration on the Human Genome and Human Rights</td>
</tr>
<tr>
<td>UDBHR</td>
<td>Universal Declaration on Bioethics and Human Rights</td>
</tr>
<tr>
<td>UNGA</td>
<td>United Nation General Assembly</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Economic, Social and Cultural Organization</td>
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<tr>
<td>UCLA</td>
<td>University of California at Los Angeles</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>VNTR</td>
<td>Variable Number of Tandem Repeats</td>
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CHAPTER 1

1.1 GENERAL INTRODUCTION

1.1.1 INTRODUCTION

The main purpose of this chapter is to provide an introduction to what has been produced in this thesis. It summarises the main topics of this research (which are elaborated in their designated chapters), such as, the background to this thesis, statement of the problem, research questions, aim and objectives, methodology, contribution, and scope and limitations of this research. It also provides an overview of the content of whole thesis.

1.1.2 BACKGROUND OF THIS THESIS

The completion of the sequencing of the human genome in 2003 represents an unprecedented milestone in the advancement of knowledge on the molecular basis of life itself. The information generated by genomics is providing major benefits for health care and is ‘a revolutionary tool for ensuring justice’. Advancements in scientific knowledge and technology have profoundly changed the temporal and spatial order of society. Knowledge of potential future health problems made available through identifying genes with their disease risks, essentially translating possible future health problems to the present, is contributing significantly to further development and growth in the field of medical science and health care. Technological development and innovation in the life sciences (that is, genomics and bioinformatics in the area of genetic research) are further contributing to this growth. The past few decades could be referred to as the ‘genetic era’. The sudden

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1 Major benefits from genomics include, ‘the prevention, diagnosis and management of communicable and genetic diseases as well as other common killers or causes of chronic ill health including cardiovascular diseases, cancer, diabetes, and mental illnesses’: World Health Organization (WHO), ‘Genomics and World Health Report of the Advisory Committee on Health Research’ (2002) 1(Foreword from the Director General).


An increasing ‘need for bioinformatics capabilities has been precipitated by the rapid growth of publicly available genomic information’\(^7\) that has resulted from the existence of various kinds of human genetic research databases throughout the world. Communities around the world are increasingly supporting bioinformatics research because of the potential benefits of large scale utilisation of human genetic information, such as in molecular medicine (for instance, preventive medicine and gene therapy). Governments of the developed countries (namely, the USA, the UK, EU and Australia) as well as some of the developing countries (such as India, Singapore, Malaysia and Bangladesh) are establishing comprehensive human genetic databases or laboratories to facilitate various uses of genetic material and information.

Current research in human genetics is not confined to the health sector and the identification of the genetic reasons for certain diseases and to the discovery of

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\(^7\) Dharmendra Kumar Meena et al, *Bioinformatics: Its Application and Perspective in Fisheries and Aquaculture* (23 September 2011) Central Inland Fisheries Research Institute (Barrackpore, Kolkata) <http://aquafind.com/articles/Bioinformatics-In-Fisheries.php>; see also Rishikesh T Krishnan, Anshu Gupta and Varun Matta, 'Biotechnology and Bioinformatics: Can India Emulate the Software Success Story?' (Paper to be presented at NSF-sponsored Workshop on The Indian Development Experience, School of Public Policy, George Mason University and Department of Management Studies, Indian Institute of Science, Bangalore, 3–5 March 2003) 3.
effective pharmaceutical or gene therapies, rather, there are some other very important areas where genetic material and information is being used, such as in criminal investigations, employment, insurance, education, immigration cases and paternity testing. Among them, the use of human genetic information in the justice delivery system is one of the significant advances of DNA science and technology. At present, genetic material and information is widely used in order to ensure social harmony and justice; however, the increasing utilisation of genetic information for justice delivery purposes is causing some challenges, such as intrusions into genetic privacy and the further development of existing disparities between developed and developing countries in a number of areas and the creation of new gaps. It is also obvious that the impact of genetic research and development and its uptake in society is highly dependent on the reaction of political, economic and social institutions. At the same time, interdisciplinary studies, such as the relation between law, IT and legal or social uses of genetics, should be recognised as an important phenomenon.

The use of scientific genetic-based evidence (that is, DNA profiling) in legal case investigation processes brings into collaboration the disciplines of science and law, which have their own institutional needs, standards and imperatives. But combination of these two disciplines is broadly geared toward ensuring justice for various cases, without completing retaining and relinquishing their autonomy. Recent scientific advances through DNA technology play an important role in providing legal protections in the terms discussed below and the preservation of law and order. The widespread use of DNA data to detect offenders and protect the rights of the innocent (that is, exonerating the wrongly-accused) is one the most

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8 It is also known as ‘DNA Fingerprinting’ or ‘DNA Typing’. For further details, see sections 2.1.3.1 (b) and 2.1.3.2 of Chapter 2.
9 It is also known as ‘DNA Fingerprinting’ or ‘DNA Typing’. For further details, see sections 2.1.3.1 (b) and 2.1.3.2 of Chapter 2.
11 Leigh M Harlan, 'When Privacy Fails: Invoking a Property Paradigm to Mandate the Destruction of DNA Samples' (2004–05) 54 Duke Law Journal 179, 179. The same article points out that '[y]et current law, which fails to mandate the destruction of voluntarily provided DNA samples, falls well short of providing genetic privacy to innocent individuals', see Harlen: at 180 (citation omitted).
notable examples of such advancements and revolutionary impact of DNA technology.

The identification of offenders and the protection of innocent suspects are two of the main goals for ensuring justice. DNA samples and profiles are very useful for identification purposes, for example, in identifying victims of disasters, as well as suspects (including rapists and murderers). It is also useful for conducting parentage testing and for resolving immigration cases where a familial relationship (or identity) is in question. The capability of DNA analysis results to accelerate the justice delivery process by identifying actual offenders is particularly significant. In many instances, suspects who are actually innocent are relatively quickly acquitted or excluded from legal proceedings. This technology is, in effect, upholding the principles of ‘presumption of innocence’ which requires that ‘guilt must be proved beyond reasonable doubt’, upon which each and every criminal justice system is based. Therefore, every accused person irrespective of his or her status has a right to get fair trial. This legal right even applies to those who have been convicted of similar offences committed in the past. The right of a ‘fair trial’ is derived from the principles of natural justice. This right has also become the norm of international and regional human rights law and it is also adopted by many countries in their

21(3–4) eMagazine: GeneWatch

13 George Clarke and Janet Reno, Justice and Science: Trials and Triumphs of DNA Evidence (Rutgers University Press, 2007) Foreword by Janet Reno, ix.


For the Australian experience see, eg, Australian Law Reform Commission, Essentially Yours, above n 8, 935–37[37.12], [37.17].


16 Universal Declaration of Human Rights, GA Res 217A (III), UN GOAR, 3rd sess, 183rd plen mtg, UN Doc A/810 (10 December 1948) (‘UDHR’), art 10 provides that ‘everyone is entitled in full equality to fair and public hearing by an independent and impartial tribunal, in the determination of his rights and obligations of any criminal charge against him’; art 14 of the International Covenant on Civil and Political Rights, opened for signature 16 December 1966, 99 UNTS 171(entered into force 23 March 1976) (‘ICCPR’) reaffirmed the objects of UDHR and provides that ‘everyone shall be entitled to a fair and public hearing by a competent, independent and impartial tribunal established by law.’ See also European Convention for the Protection of Human Rights and Fundamental Freedoms,
procedural law, though the form and practice of the principles of natural justice may vary from system to system on the basis of prevailing conditions of the society concerned. This is one of the fundamental canons of modern democracy and is reflected in legal jurisprudence throughout the world. With the support of DNA technology, the right for a fair trial has been enhanced, particularly in developed countries. It has also contributed to the speedier administration of justice.

During the mid-1980s, the potential application of DNA typing or profiling was initiated by laboratories in the United Kingdom (UK), the United States (US), and Canada. The modern forensic DNA typing invented by Professor Alec Jeffrey was first used in the Colin Pitchfork case in 1985 in the UK. This was the first criminal case in which DNA was used and the resolution of this case provided an effective demonstration of this method’s potential. It also demonstrated for the first time how a small DNA sample could be used to identify a perpetrator from amongst a large population. By the late 1980s the technology was being used in the US by commercial laboratories and the Federal Bureau of Investigation (FBI). The pioneering Colin Pitchfork case and the rapid development of DNA technology databases firmly pointed toward the future of DNA profiling as the most important forensic investigative tool to be developed in the 20th century. Within relatively few decades, DNA technology became commonly used in the investigative processes of many countries (including both developed and developing nations) and also by their local forensic and/or DNA laboratories. However, the forensic use of DNA data is always subject to particular scrutiny because of its potential benefits for criminal and civil justices, but also due to the possibilities for its misuse or abuse. Some important

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18 Genetic Analysis System Boosts Criminal Justice', above n 14.
20 For further detail see section 2.1.3.1 (b) of Chapter 2.
22 Peter Gill and John Buckleton, 'Biological Basis for DNA Evidence' in John S Buckleton, Christopher M Triggs and Simon J Walsh (eds), Forensic DNA Evidence Interpretation (CRC Press, 2005) 1, 2.
ethical, legal and social concerns have been raised about its use since it was first trialled in the 1980s.

The following section will discuss the issues and problem areas identified by this thesis.

1.1.3 STATEMENT OF THE PROBLEM

It is well recognised that genetic science is one of the most dependable sources of truth, particularly in disputes concerning human identity. Sheila Jasanoff has rightly pointed out that:

Genetic science produces truthful facts about human identity, and that establishing the truth in matters of identity is equivalent to ensuring justice.23

As a result, DNA profiling or ‘fingerprinting’ is increasingly used for human identification in the legal proceedings of many nations.24 Forensic DNA technology is used to analyse DNA profiles which normally originate from human DNA samples. These samples could be collected either from the crime scenes or from the body of suspects or victims. Then DNA profiles (that is, the analysis results of the DNA samples collected) are compared with previously stored profiles in the DNA database to locate matches. The forensic use of DNA samples and profiles has, therefore, enhanced the success of civil as well as criminal investigations and the process has already proved to be a valuable tool for delivering a speedy trial and justice. Recognising the potential of DNA Technology, in the case of People v Wesley it was observed that ‘DNA Typing is the single greatest advance in the “search for truth” ... since the advent of cross-examination’.25

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23 Jasanoff, above n 10, 332.
Now countries are establishing and expanding human DNA databases\textsuperscript{26} for their use in civil and criminal intelligence with such bases ‘ranging in size from a few hundred to a few million samples’.\textsuperscript{27} DNA databases are, therefore, an extraordinary resource for forensic evidence.\textsuperscript{28} Use of DNA profiling by law enforcement agencies was initially justified for identifying rapists, murderers and other heinous offenders, but it has gradually been expanded to involve suspects of various other crimes. Since the events of 9/11 in the US, law enforcement agencies around the world have expanded their areas of investigation and the techniques used. The expansion and use of forensic DNA databases has also been justified on the basis the threat of terrorism. However, there are several ethical objections to such uses. The implications to society have been raised because of extensive uses of human DNA data and DNA databases.

One of the important issues is that the increasing utilisation of human genetic information in the justice delivery system can lead to violations of ‘human rights and privacy (including genetic privacy)’. DNA samples are a potential source of human genetic information and can reveal sensitive health information. It can, therefore, violate bodily integrity, privacy (information concerning health, familial relationships and so on) and facilitate discrimination against people and have other social consequences.\textsuperscript{29} At the same time, while addressing human rights and privacy issues and also to ensure proper use of DNA data, some gaps (financial, technological, cultural and social) possibly exist between developed and developing countries that need also to be addressed. So, the following two main problem areas have been identified by this research project:

Firstly, the issues with regards to human rights and privacy challenges in the context of forensic use of DNA or genetic information; and, while using such information in

\textsuperscript{26} Currently ‘56 countries worldwide operate national DNA databases from Asia to Europe and the Americas’: Andrew D Thibedeau, ‘National Forensic DNA Databases’ (Council for Responsible Genetics, 2011).15.
\textsuperscript{28} Simoncelli, ‘Dangerous Excursions’, above n 15, 393.
case of criminal or civil case investigations, how these issues could be balanced with public interest or state security measures.

Secondly, evaluation of gaps between developed and developing world, more specifically the capacity of the developing countries to ensure proper use of this newly emerged technology in their justice delivery systems.

1.1.3.1 Human Rights and Privacy Objections

It has already been argued that the modern justice delivery system has become increasingly efficient and significantly more accurate through the advent of ‘DNA profiling’. However, the forensic use of DNA databases (containing DNA samples and profiles) has the potential to incur costs in terms of civil liberties and human rights violations, including genetic privacy. Most objections are connected with the collection, retention, access and use of DNA samples that are the basis of DNA profiles. Many forensic DNA databases retain DNA samples from various persons, including innocent people where the person has been acquitted after conclusion of the judicial proceedings, or where the charges were dropped or not proceeded with, or even where the samples are from persons excluded from investigation by that very sample. When DNA samples are kept and retained in any databases, it is possible to gather the utmost personal information about any individual (and including his or her family) with regard to certain characteristics, including predisposition to certain diseases. This is because ‘[g]enes are considered to be good predictors of many facets of human identity’. They can indicate human physical traits (for example, eye colour) and a predisposition to certain diseases (for example, heart disease, inherited breast cancer). An examination of DNA samples can also detect genetic conditions that affect intelligence (for example, phenylketonuria) but sometimes not the degree to which a genetic condition may manifest itself (for example, Down syndrome). It can also indicate a predisposition to certain mental illnesses (such as, schizophrenia). Some researchers believe that DNA contains information regarding

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30 Harlan, above n 11.
31 Patyn and Dierickx, above n 29.
33 Jasanoff, above n 10, 337.
‘a series of behavioural characteristics, ranging from thrill-seeking\textsuperscript{34} to aggression\textsuperscript{35} and ‘the propensity for aggressive, addictive, or criminal behaviors’.\textsuperscript{36} A number of authors and researchers, however, dispute the claims made in regard to the usefulness of DNA samples as predictive of such behaviours (rather than associated in some instances with certain behaviours), and point to the complex interactions of genetics and environment.\textsuperscript{37} In addition, it is also ‘well recognised that DNA contains information regarding familial lineage\textsuperscript{38} or pedigree. Such sensitive data has raised concerns for individual and familial privacy. As Simoncelli has observed:

\begin{quote}
DNA data banks pose a number of significant individual privacy concerns ... Unlike fingerprints ... DNA samples can provide insights into personal family relationships, disease predisposition, physical attributes, and ancestry. Such information could be used in sinister ways and may include things the person herself does not wish to know. Repeated claims that human behaviors such as aggression, substance addiction, criminal tendency, and sexual orientation can be explained by genetics render law enforcement databases especially prone to abuse.\textsuperscript{39}
\end{quote}

Further the DNA identification of a suspect can potentially bring police officers to the doors of his or her relatives to ask questions about their genetic relationship to the offender (or arrestee) and their whereabouts at the time of the crime.\textsuperscript{40} An even more striking intrusion of privacy is when law enforcement agencies directly interrogate a suspect’s family members, very often to request their DNA.\textsuperscript{41} This has some obvious societal as well as practical implications. For instance, it can potentially destroy a person’s marital life, disrupt his or her career, or even ruin his or her whole life. In this regard Sonia M Suter has rightly pointed out:

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\begin{flushright}
\textsuperscript{38} Drobner, above n 36, cited in Harlan, above n 11, 181.
\textsuperscript{39} Simoncelli, ‘Dangerous Excursions’, above n 15, 391–2.
\textsuperscript{40} Sonia M Suter, 'All in the Family: Privacy and DNA Familial Searching' (Spring 2010) 23(2) \textit{Harvard Journal of Law and Technology} 310, 349.
\end{flushright}
All of these actions imply that the relative is a suspect or, at least, a person of interest, which itself can be threatening, intimidating, and intrusive. At best, such an investigation is a hassle or form of harassment. At worst, it violates the relative’s privacy interests by subjecting them to a “lifetime [of] genetic surveillance”.42

There are some important uses of DNA by the law enforcement and judicial proceedings, but it is also true that neither law enforcements nor the courts adequately consider the full extent of the privacy threats posed by DNA profiling.43

Furthermore, the ‘forced or non-consensual’ collection of DNA samples from individuals constitutes a possible threat to bodily integrity.44 The potential further use of DNA data stored in DNA databases constitutes a potential threat to bodily integrity and genetic privacy. Rules and policies concerning DNA sample collection, entry and removal criteria of DNA samples on a database generally as well as the placement and retention of profiles on forensic DNA databases specifically imply some more ethical challenges.45 In general, ethical issues surrounding obtaining DNA data focuses on the concept of ‘informed consent’.46 Upon obtaining fully informed consent, taking and storing DNA data is no longer unethical. There are some instances where subsequent access by a third party has been permitted, where the question of ethics appears to have been ignored, such as where a DNA profile of

43 Suter, above n 40, 312.
44 Williams and Johnson, 'Inclusiveness, Effectiveness and Intrusiveness' above n 32, 546.
46 In this regard Amy Harmon argued that: There are lots of instances and court decisions providing what constitute violation of informed consent issue, such as, in the case of the Havasupai tribe of Arizona, members of the tiny, isolated tribe had given their DNA samples to the Arizona State University researchers starting in 1990, for the express purpose of looking for genetic clues to the tribe’s devastating rate of diabetes. But they learned that their blood samples had been used to study many other things, including mental illness and theories of the tribe’s geographical origins that contradict their traditional stories. In this case researchers and institutions are required to obtain ‘informed consent’ from sample providers, ensuring that they understand the risks and benefits before they participate. But they failed to fully follow this requirement and incur punishment.

a suspect is uploaded onto a national forensic DNA database, and access to this database (including that suspect’s profile) is later given by police to another government agency for studying behavioural genetics. Such access and use, however, is justified only with ‘free and informed consent’ of the sample provider. Such use is also granted only for the purposes it was originally collected. In this regards, some could argue that convicted persons have fewer civil rights; however innocent donors or suspects who are later acquitted do not lose their right to informed consent, and they should have a legitimate claim before a court of law.\footnote{Council for Responsible Genetics, Forensic DNA Collection: A Citizen's Guide to Your Rights Scenarios and Responses (18 June 2011) <http://www.councilforresponsiblegenetics.org/pageDocuments/6W7Q3D7RM.pdf>}. This is, of course, contingent upon whether the consent given is fully informed or not, as this is required to make the decision. Some additional ethical issues associated with informed consent include: what ‘informed’ truly indicates, and how to ensure that the consent provider is actually informed.\footnote{Nicholas Dufour et al, DNA Fingerprinting (Degree of Bachelor of Science Thesis, Worcester Polytechnic Institute, 27 August 2008)73–4.} Further, it is very often argued that for the future collective well-being of society or public good, individuals’ should provide their DNA samples. Rules and practices of informed consent, therefore, supply a framework for what has become a moral duty for citizens, that is, to comply with technical interventions for the sake of the administration of justice. However, little attention has been paid to the duties of the management or custodians of forensic DNA databases\footnote{Garrath Williams and Doris Schroeder, 'Human Genetic Banking: Altruism, Benefit and Consent' (2004) 23 New Genetics and Society 89, 90, 100.} with regards to the protection of sample providers’ rights.

Other than law enforcement purposes, DNA information is being used for statistical, educational and medical research purposes.\footnote{Mark A Rothstein and K Talbott Meagher, 'The Expanding Use of DNA in Law Enforcement: What Role for Privacy?' (2006) 34(2) Journal of Law, Medicine and Ethics 153, 159.} Consequently, a group of individuals, corporations, and agencies are interested in such sensitive information about the human body.\footnote{Harlan, above n 11,181.} Release of this sensitive genetic information could have some far-reaching familial and social implications. It could, for example, influence placement decisions by adoption agencies, allow prospective spouses to select their mates based on perceived genetic advantage and so on. It could also give rise to discrimination against and stigmatisation of an individual or groups. Moreover, such biological
information could give rise another class in the society: a ‘genetic minority’ or an underclass of those perceived as genetically inferior. This could mean that solely on the basis of biological information, society could discriminate against individuals deemed ‘substandard’ subjecting such persons to custodial arrangements or to specific eugenic measures designed to eliminate those whose DNA manifested the undesirable trait. Such measures could include compulsory sterilisation of those of reproductive age, and compulsory pre-conception or pre-implantation testing, or termination of foetuses conceived with the undesirable DNA trait. This could theoretically occur even though it is a mere prediction or a possibility not a certainty that some undesired trait or characteristics may be manifested in them.

In some jurisdictions, human rights and privacy objections are sometimes overlooked by stressing that collection and use of DNA data as very useful for maintaining law and order. Many DNA databases around the world retain DNA samples, including those of innocent suspects, for a period of time even after finishing the investigation. The main justification for such retention is that persons who later commit more crimes can be identified and apprehended quickly. Indefinite retention of DNA data collected from suspects and other individuals has given rise to questions about privacy rights. In the case of S and Marper v the UK, S and Marper claimed that retention of their DNA samples and profiles interfered with their right to respect for private life because this sensitive information is linked to their personal identity. They argued that such types of information should be kept within their control. The


53 Harlan, above n 11, 182.


56 S and Marper v United Kingdom (European Court of Human Rights, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008).
administrative court rejected their application and an appeal to the UK House of Lords was also dismissed.\footnote{Ibid [12], [15].} Lord Steyn concluded that the mere retention of fingerprints and DNA samples did not constitute any interference with private life and it was proportionate to what was necessary for detection investigation and prosecution of crime.\footnote{Ibid [19], [21].} UK legislation does not require the destruction of DNA samples and they may be retained even after fulfilment of the purpose for which they have been collected.\footnote{Police and Criminal Evidence Act 1984 (UK) c 60, s 64(1A) (‘PACE Act’).} Finally, however, on appeal to the European Court of Human Rights (ECtHR), the Court ruled that the ‘blanket and indiscriminate nature of the powers of retention of the fingerprints, cellular samples and DNA profiles of persons suspected but not convicted of offences’ violates the right to respect for private and family life.\footnote{S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [125]–[126].} The case pioneered developments in this field, the rules it recommended be adopted and the procedures it advised to be followed have been of considerable influence in other contexts around the world. Although the ECtHR has provided its ruling protecting human rights and privacy in 2008; at this stage it is essential to analyse how many national jurisdictions (including the UK) have taken appropriate measures in pursuit of the principle and rule set forth by this judgment.

Finally, it can be argued that there are two opposite but essential interests: one is human rights and privacy; the other is law enforcement for public safety and security. It is, therefore, important to take appropriate measure for balancing the constitutional guarantee of right to privacy and other human rights with the government’s duty to ensure public safety as well as secure the well-being of its citizens. The main idea or notion is respect and lawful protection to society without hindering individual privacy. In this respect Laura A Matejik highlighted that:

In the case of DNA collection there is a delicate balance between an individual’s freedom to drink, spit, or blow his nose without fear that law enforcement will collect his genetic information and society’s interest in efficiently resolving tragic crimes.\footnote{Laura A Matejik, ‘DNA Sampling: Privacy and Police Investigation in a Suspect Society’ (2009) 61 Arakansas Law Review 53, 57.}
It can be argued that technology is a powerful force for protecting human rights. However, such technology can also slowly and steadily link humankind with ‘an all-pervasive monitoring system’ leading towards a surveillance society.\textsuperscript{62} What Laura A Matejik argued in her earlier quotation, the editorial of the journal \textit{Nature} similarly pointed out that in order to honour and uphold the spirit of the \textit{Universal Declaration of Human Rights (UDHR) 1948}, a balance needed to be struck between individual freedom and social interests.\textsuperscript{63}

1.1.3.2 \textit{Gap between Developed and Developing Countries}

The use of a forensic DNA database generates enormous financial expenditures (that is, costs related to management, DNA testing, maintenance of advanced technology, manpower and training, and so on), as well as non-financial burdens (that is, the protection of human rights and privacy). A society or a state that wants to use a system of forensic DNA databases therefore needs to balance the ‘costs’ and ‘benefits’ of such a system. A society or state has to be willing and have the ability to cover these costs. The financial costs are a particular burden for developing countries, which cannot bear the same costs as developed countries to maintain sophisticated technology like DNA databases. The correlated activities of DNA data sharing, co-operation and co-ordination between developed and developing countries then falls into some uncertainty. Questions of equal standards, quality and ability (in terms of financial, technological and human resources) raise important issues. Another variance between nations emerges when concentrating on the non-financial costs, with fundamental social and political choices to be made between security and liberty (that is, human rights and privacy protection). Although ‘forensic DNA databases increase security, at the same time they restrict the liberty of citizens’.\textsuperscript{64} All countries, but arguably most particularly developing countries, are therefore challenged to determine ‘what importance it [should] attach to these different values’.\textsuperscript{65}

\textsuperscript{63} Ibid.
\textsuperscript{64} Patyn and Dierickx, above n 29, 320.
\textsuperscript{65} Ibid.
According to the statistics given by the INTERPOL DNA Unit, it is evident that almost all over the world the techniques of DNA profiling and its related databases have gained immense popularity, and, depending on their capabilities, countries from different regions are taking initiatives to establish DNA databases. One point that should be noted here is that the number and success rate of establishing or running these databases is higher in developed countries compared to the figures for the developing world. In the age of high technology and globalisation it is important to address why there are such inconsistencies or gaps. This thesis will address these issues in chapters 5, 6, and 7.

In summary, a second but equally important issue that has been identified by this project is that there are some extra challenges for the developing world compared to the developed countries in the area of the forensic use of DNA information and databases. These include a lack of knowledge and expertise as well as lower levels of financial and technological resources. This study focuses first on the human rights and privacy issues related to the forensic use of DNA information. It will then address relevant gaps between developed and developing countries in this area.

1.1.4 RESEARCH QUESTIONS

1.1.4.1 Primary Questions

The central questions to be addressed by this research project are:

1. Is there any scope for human rights and privacy violations in the context of forensic use of DNA data, and how can these issues be balanced with public interest or state security measures?

2. Is there any gap between developed and developing countries concerning the forensic use of DNA data in the justice delivery system, and how can this gap be addressed and/or minimised?

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66 ICPO-INTERPOL and Interpol DNA Unit, 'Interpol Global DNA Profiling Survey Results and Analysis 2008 ' (ICPO-INTERPOL,Version 2, 2009); see also Interpol DNA Monitoring Expert Group, 'Interpol Handbook on DNA data exchange and Practice' (INTERPOL, 2nd 2009) 52–6; INTERPOL DNA Unit, 'Global DNA Database Inquiry Results and Analysis' (2002).

67 Thibedeau, above n 26.
1.1.4.2 **Secondary Questions**

i. Is there any scope for revealing health information from DNA samples and profiles collected for case investigation purposes?

ii. What are the collection and storage mechanisms for DNA samples and for profiling in the forensic DNA database?

iii. How far it is possible to take voluntary and informed consent from suspects and other individuals while collecting their DNA samples?

iv. How long should a DNA sample be retained in the database?

v. Which parties should have access and the right to use the genetic data stored in the forensic DNA database?

vi. Is it possible to violate privacy (including genetic privacy) while using DNA samples and profiles for forensic purposes?

vii. How far are the developing countries well equipped to ensure the proper use of DNA database in the justice delivery system?

viii. What kind of standard should develop between and among both developed and developing countries to protect human rights and privacy without compromising public interest or state security measures, and to minimise gaps between them?

1.1.5 **OBJECTIVES OF THE RESEARCH**

The main aim of this research project is to look for the human rights and privacy violations issues in the context of the forensic use of DNA or genetic information, and how such issues could be balanced with public interest or state security measures. Another intention is to illuminate the gaps between developed and developing countries, more specifically the capacity of developing countries to ensure the proper use of this newly emerged technology in the justice delivery system. In order to achieve this aim, this study has determined some objectives and goals. The main objectives of this research project are to:

- Conduct two case studies on two forensic DNA databases, one from the UK, as a developed country, and the other from the Bangladesh, as a developing country.
• Examine the current practices of these two forensic DNA databases, including their management, governance frameworks and guidelines (for instance, rules regarding the collection, storage or retention, access and use of genetic information);

• Investigate the scope for human rights and privacy violations in the context of forensic use of DNA data and databases;

• Investigate the gap between the developed and developing countries regarding forensic DNA database management (including technological and economic gaps), and also to evaluate the needs and concerns of developing countries regarding forensic use of DNA information;

• Assess the adequacy and effectiveness of the current mechanisms, and investigate some measures regarding how to balance individual privacy rights and public interests in the forensic use of DNA information.

The achievement of these above mentioned objectives are significant for the current research project.

1.1.6 METHODOLOGY AND APPROACH

Choosing an appropriate research methodology is an essential part of any research project. There are several research methodologies, but the combination of qualitative and quantitative research (that is, mixed methods) has been particularly welcomed by social science researchers. In recent years mixed methods have also been used in socio-legal research projects. In addition, the diversification of research methods allows a better understanding of the research phenomena and the use of multiple research methods also increases the validity of the collected data and derived outcomes. In order to achieve the aim and objectives of this project and answer the research questions, this study has pursued three different approaches to gather research materials:


1. Analysis of Literature and Legislation;
2. Case studies of selected countries; and
3. Qualitative (semi-structured interview) as well as quantitative (survey) data.

This thesis analyses national and international legislation, case-law and literature relevant to the field of genetic information. Following this analysis, two case studies have been selected regarding two different human DNA facilities or service systems — one from the UK (representing the scenario of developed countries) and another from Bangladesh (highlighting the problems of developing countries). In order to understand the legal, administrative and management process as a whole, these DNA databases have been critically examined and analysed from different perspectives. For instance, attention has been paid to how they collect, store and retain genetic information, how they allow third parties to access such information and to what extent such practices are perilous to human rights and individual privacy. But collecting, storing and accessing information is not the whole picture: how these databases are operating in the existing legal paradigms that address all these issues both in the UK and Bangladesh is a central issue addressed in this study. The analysis identifies some weaknesses regarding the usual practices of such databases in the area of human rights and privacy. Significantly, the two case studies illuminate the gaps between developed and developing countries regarding the establishment of DNA databases and the forensic use of DNA information. That is how the case studies and data analysis results address the two main focus or research questions (that is, human rights and privacy violations as well as gaps between developed and developing countries) of this study.

The first case study involves the UK National DNA database (hereinafter referred to as the NDNAD) and represents a developed country’s approach. This case study has been critically analysed through a range of information sources, including international treaties or conventions, national legislations, judicial decisions, journal articles, reports, and newspaper publications. On the other hand, as a part of the second case study on the Bangladesh National Forensic DNA Profiling Laboratory (hereinafter referred to as the NFDPL), semi-structured interviews as well as survey methods are employed as a primary data collection technique. Use of DNA technology in the Bangladeshi justice system is a new trend and, consequently, there
is a shortage of archival or secondary sources (that is, legislative and other literatures). The author has therefore had to analyse and argue this case study based on primary data (semi-structured interviews and survey). Semi-structured interviews were conducted before a survey was administered. The mixed methods of qualitative (interview) and quantitative (survey) strategies have been used to explore the objectives of this case study.

Further, in order to argue the research questions and analyse the qualitative data, a part of the second case study has used grounded theory (GT). GT has been applied in collected data (the responses to the semi-structured interviews) in order to generate a theory. Although Glaser\textsuperscript{70} discourages in depth literature reviews in the studies where the GT method is applied, he does not intend that the researcher ignore the literature altogether. The initial literature review for this study was undertaken when the research proposal was being written in order to determine the scope, objectives, and type of research that had been conducted in the area under study.\textsuperscript{71} One important point should be noted here that with regards to the case study on the NFDPL (Bangladesh), there is a serious lack of secondary research materials. The scenario of this case study is, therefore, more suitable for the application of the GT method. As a result, the capacity of the NFDPL of Bangladesh (as representative of a developing country) to handle human rights and privacy challenges as well as its gap with the NDNAD has been revealed from this qualitative data analysis (that is, through the application of the GT method). These data analysis results are also verified and supported by the quantitative data analysis results. While collecting data, and applying both qualitative and quantitative methods, the author has chosen nine participants from the NFDPL of Bangladesh. The use of mixed methods was also helpful in providing evidence to support or disprove the hypothesis or problem statements, particularly with regards to the case study on the NFDPL (Bangladesh).

This section gives an overview of the research methodology and design adopted. A more detailed discussion of the methodology and approach used in this study is given


in Chapter 4 of this thesis. Chapter 4 provides a detailed description of the research design (that is, how this research has been undertaken ‘step by step’).

1.1.7 CONTRIBUTION OF THE RESEARCH

Research about human genetics is highly significant both for the contemporary world community and for the future generations. Michael Kirby J rightly pointed out that:

Perhaps, from the perspective of history, the most important scientific breakthrough of this century may be seen, in time, to be neither nuclear fission, nor interplanetary flight, nor even informatics, but the fundamental building and basal molecular biology which permits the human species to look into itself and find, at last, the basic building blocks of human and other life. Who knows where this discovery will lead the imaginative human mind? Lawyers, and indeed citizens everywhere, should begin thinking about the issue. In its resolution may lie the very future of our species?72

The debate about research in human genetics and use of genetic information reveals two major yet mutually dependent opposite views. One is based on the notion of the positive, often medical use of genetic information, such as its use in research leading to the discovery of gene-based therapies (or pharmacological products) and consequent health care benefits as well as the forensic use of DNA to assist in the detection of criminals or the exoneration of innocent people. The other is based on the violations of human rights and privacy that may be involved in case investigation, or the negative uses to which genetic information may be put. This study is therefore significant, as it will identify the areas or scope of misuses of DNA data (that is, violation of human rights and privacy), particularly in the justice delivery system of both developed and developing countries. The findings of this research will also contribute to the discovery of issues related to the violation of human rights and privacy as well as to the prevention of such violations.

It is argued that DNA information, particularly that of a sensitive nature, can be subject to misuse if it is not properly managed. The privacy of such information can be abused and the information can be used to discriminate against individuals. Negative attitudes towards populations able to be genetically identified as having

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‘less than optimal’ characteristics (for example, prone to arthritis, diabetes or heart disease, or as sufferers from cystic fibrosis or someone who will develop Huntington’s or Parkinson’s Disease or is a carrier and so on) could also give rise to a new concept, that of a ‘genetic minority’, and new forms of discrimination. Such a population could be identified as ‘genetic sub-class’ in society. The adoption and popularisation of such a concept would be as harmful as racism, leading to employment and health insurance discrimination against them, including ‘potential social and psychological consequences (for example marital decisions, reproductive choices) for the individuals and their families. It is, therefore, important to identify specific instances and causes of existing genetic discrimination to gain some idea of a probable picture of future discrimination issues that might arise due to large scale research databases being mined for information and act now in a proactive manner to protect people rather than in response to individual instances as they arise with all the delays that such an approach necessarily involves. This study also significantly contributes in addressing the debate about the creation of a ‘genetic minority’, and also suggesting mechanisms to combat these new challenges.

It is important to consider that a cautious use of sensitive DNA data is critical to realise public benefits, especially for poorer nations, rather than impeding the development and application of genetic technology. The ‘cautious use’ refers here to the use of DNA data, being aware of and considering its associated problems. This project has worked to pinpoint or determine the problems faced by developing countries as they use the DNA data in their justice delivery systems.

As alluded to earlier, two case studies have been selected in this study. The comparison of these case studies (that is, the NDNAD of the UK and the NFDPL of Bangladesh) will reveal the existing scenario of both these DNA databases, including


74 ‘Knowledge [from genetic test] results may lead to the marginalisation of the individual from mainstream society by virtue of the health risks identified. Discrimination can be in the form of denial of health insurance, employment or simply social acceptance’: World Health Organization Genome Resource Centre, Genetic Testing (23 November 2011) World Health Organization (WHO) <http://www.who.int/genomics/elsi/gentesting/en/>.
their contribution in their respective justice systems, the scope of privacy and human rights violations, as well as gaps between these two forensic DNA service systems. The case study on Bangladesh is more realistic and concrete with qualitative (semi-structured interview) and quantitative (survey) data. The data collected illustrate the existing scenarios and challenges faced by Bangladesh with regard to DNA information handling. As a result, the outcome of this part of the research (that is, the Bangladesh DNA service system case study) will significantly contribute to the improvement of the justice delivery system of Bangladesh. Further, the study will reveal the gaps between developed and developing countries in regard to the use of DNA databases for forensic purposes, and also uncover areas where more emphasis needs to be given to minimise such gaps. This way the research outcomes will be a good guide for the world community in developing its awareness of these challenges. The research outcomes will similarly contribute to ensuring the proper use of human genetic information for both developed and developing countries.

In addition, this research will be a valuable contribution in the area of the forensic use of DNA information. The intention is to ensure that, even in exceptional circumstances, human rights, justice and sustainable development are not compromised. This project will propose some mechanisms to ensure the proper use of human genetic information that will be applicable across both developed and developing countries. A suitable legal approach is essential for the global community to ensure the proper use of genetic information worldwide. Finally, to the best knowledge of the author, there has been a shortage of legal analytical research on the core theme of the thesis. There is also lack of socio-legal research in this field. Therefore, this research project will make an original contribution in the field of ‘forensic use of DNA information: human rights, privacy and other challenges’.

1.1.8 DELIMITATION OF SCOPE

The scope of this study did not cover the research related to human genetics which deals with the health sector to identify genetic reasons for certain diseases and to discover effective drugs as well as identify the area of misuses of such information. Rather this research project has focused only on the issues related to human rights and privacy violations in the context of forensic use of DNA information, and the gap between the developed and developing countries in addressing these issues. As
has been mentioned earlier, this study has concentrated on two case-studies — one in the UK and one in Bangladesh — in order to gain an overview and examine the existing situation of both developed and developing countries. Such case studies have revealed the existing scenario about the issues involved in two different countries that have completely different political, economic, social and cultural backgrounds. Finally, this project particularly concentrates on balancing the two opposite but essential interests to ensure proper use of human genetic information (that is, its use while protecting human rights and privacy) in the justice delivery system. Finally, this project particularly concentrates on balancing the two opposite but essential interests — the use of DNA information to ensure justice (that is, public safety and national security) as well as to protect individual’s right to privacy — in other words to ensure proper use of human genetic information in the justice delivery system.

1.1.9 THESIS STRUCTURE

This thesis is divided into seven chapters. The first chapter introduces the problem associated with the forensic use of DNA information, particularly human rights and privacy challenges, as well as gap between the developed and developing countries in addressing these issues. It also contains the research questions and objectives, the adopted methodology and approach, the anticipated contribution of the research, and the delimitation of scope of this thesis. The discussions are divided into a number of sections. Sections 1.1.1 and 1.1.2 give a brief introduction and background of this research. Section 1.1.3 identifies research problems and issues and section 1.1.4 focuses on the research questions. Section 1.1.5 describes the research objectives and then section 1.1.6 elaborates on the methodology and approach whilst sections 1.1.7 and 1.1.8 highlight the contribution and delimitation of scope of the research. Section 1.1.9 describes the thesis structure. Section 1.1.10 presents the limitation of this study and finally section 1.1.11 provides summary and a brief conclusion.

Chapter 2 (which includes sections 2.1.2 and 2.1.3) begins with the basis of DNA profiling and a brief scientific background of DNA. Then section 2.1.4 examines the significance of the forensic use of DNA profiling. Section 2.1.5 subsequently discusses forensic DNA databases and the existing scenario in the international context. The last section (section 2.1.6) of this chapter comprises the conclusion.
Overall, Chapter 2 sets out a brief account of how research relating to human genetic information has increased in recent years through technological development and what kinds of threats are involved in such developments (such as, the use of DNA profiling in the justice delivery system) from a very general point of view. The purpose of this chapter, therefore, is to provide a clear understanding of the background information relating to the issues identified by this research. At the introductory stage, the discussion also gives an overview about the justification and foundation for this research.

Chapter 3 focused on the ‘forensic use of DNA information v human rights and privacy challenges’. This chapter begins with the discussion on human rights, right to privacy and genetic privacy and provides an overview. Then section 3.1.3 of this chapter provides details about right to privacy, genetic privacy and its existing legislative justifications both in a national and international context. This section further examines case law related to privacy and genetic privacy issues. Section 3.1.4 subsequently compares the forensic use of DNA information and the right to privacy; and then section 3.1.5 outlines the future of the forensic use of DNA information. Finally, this chapter concludes (section 3.1.6) with a brief consideration of how these two mutually opposite but inter-dependent issues could draw on one channel so that fair use of forensic DNA data can contribute in the maintenance of social harmony and justice.

Chapter 4 describes and explains the strategies related to research methods and the design of this study. It mainly describes the study methodology, case study process and the data collection methods. Section 4.1.2 justifies the applicability of socio-legal research methodology, including the reason for using multi-stage research design in this study. The discussion of this section further deals with the analysis of relevant legislation and other relevant texts, and then it provides an overview of the empirical analysis of case studies that have been undertaken in this research. Later, section 4.1.3 discusses the qualitative method (including how two case studies have been undertaken and semi-structured interviews conducted). This section also discusses ethical considerations pertaining to the data collection methods. Sub-section 4.1.3.4 then describes the qualitative data analysis strategy (which includes the constant comparative method of GT, the process of coding of interview data, and
the data analysis). Section 4.1.4 provides information on how the quantitative method has been applied, the justification and limitation of quantitative method, and includes survey questionnaire design as well as procedures, and the quantitative data approach to analysis. Finally, section 4.1.5 provides a brief conclusion.

The empirical part of this thesis begins with chapter 5 which focuses on the case study of the NDNAD of the United Kingdom (UK that is, England and Wales). It provides a general framework to understanding the DNA database managing capacity of a developed country. The main factor involved in this process is ‘human rights and privacy violations’ in the context of developed countries (that is, the UK). Section 5.1.2 of this chapter sketches the forensic use of DNA information in the developed countries context. Then section 5.1.3 gives an overview of the case study of the NDNAD representing the developed countries context and section 5.1.4 provides a brief idea about the UK and its human rights situation. Section 5.1.5 mainly focuses on the background to and nature of the NDNAD of the UK; its governance, management and oversight; technology in use; and the database governance regulatory or legislative framework of the UK. This section also highlights the NDNAD practices of DNA sample collection, storage or retention, and access and use. This section further analyses the benefits of the NDNAD. Section 5.1.6 explores the challenges (particularly human rights and privacy violations) regarding the access and use of the NDNAD. This section mainly analyses the Marper Case (2008)\(^75\) focusing on the debate about the right to individual privacy v public interest. Finally, section 5.1.7 concludes with a brief consideration of the impact of these risks and challenges.

Chapter 6 focuses on the second case study of this thesis: the NFDPL of Bangladesh. Firstly, section 6.1.2 provides an overview of the historical, social, economic, political and legal background that contributes to understanding the conditions under which the country is developing and the extent of its capacity to manage a new technology with limited resources. Section 6.1.3 then provides a brief description of Bangladesh and its human rights situation. Section 6.1.3 mainly focuses on the background to and nature of the NFDPL; its governance, management and oversight;

\(^75\) *S* (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008).
technology in use; and the uses and benefits of the NFDPL. This section also highlights and examines existing practices (that is, of DNA sample collection, storage or retention, access and use), as well as the legislative framework for the NFDPL. Section 6.1.4 provides an analysis of collected data, focusing on the risks or challenges associated with the NFDPL. In this section, collected data (via by both qualitative and quantitative data) have been thoroughly analysed. Overall, Chapter 6 addresses how the Bangladeshi government manages the financial and technological issues as well as other challenges in governing the NFDPL. Finally, section 6.1.5 provides a brief conclusion.

Chapter 7 contains the conclusions and recommendations of this study. This chapter mainly focuses on the comparative analysis between the NDNAD of the UK and NFDPL of Bangladesh. Section 7.1.2 begins with a comparative study of the legal-political, socio-economic and human rights situation of the UK and Bangladesh. Section 7.1.3 then compares the findings from the two case studies. This section mainly compares the case studies issue by issue. Based on the findings from the comparative analysis, sections 7.1.4 and 7.1.5 provide some recommendations and way forward respectively. Finally, section 7.1.6 summarises the whole chapter and draws a general conclusion of the entire thesis.

1.1.10 LIMITATION OF THIS STUDY

One of the main limitations of this study is the shortage of secondary materials or archival sources of materials about the NFDPL, Dhaka, Bangladesh — the subject of the case study which had been selected to represent the scenario of a developing country — and where is a big gap between theory and practice with regard to DNA profiling and their use in the criminal justice system of Bangladesh (as alluded above). This is because its use is fairly new in Bangladesh; and, therefore, there is a serious shortage of archival sources of information. As a result, the researcher had to concentrate on the collection of primary data using both qualitative and quantitative methods. Data has first been collected applying qualitative method (semi-structured interview), and then quantitative method (a survey of the same nine participants) has been utilised in order to support and to verify the qualitative data analysis.
Another limitation of this research project was to complete the first case study based on literature review and secondary data due to time constraints on empirical data collection. However, the breadth and depth of the secondary research material related to this UK case study were such that the primary data collection was not considered to be a high priority. Data collected from secondary sources was suitable and updated enough to answer the research questions.

1.1.11 CONCLUDING REMARKS

Science in the twenty-first century serves the law in indispensable ways, by providing evidence for and against particular accounts of how things happened that are of concern to the law. Genetic science, particularly through the powerful technique of DNA-based identification, has come to play an increasingly crucial role in the conduct of legal investigations and in the resolution of a myriad of civil and criminal disputes. In little more than 25 years, DNA profiling has moved from the status of novel and contested scientific evidence to a ‘taken for granted’ implement in the toolkit of forensic science. Much progress has been made toward standardising the process of DNA profiling and ensuring high levels of quality control in DNA testing facilities. Yet although the admissibility of DNA evidence is no longer in doubt, its use in the legal system continues to raise new questions about civil liberties (that is, human rights and privacy issues).

Doing justice, in most cases, ‘demands a complex balancing of multiple considerations’: using DNA data while considering its human rights and privacy issues in general, and also keeping in mind the needs and capacity of the developing countries to use such technology. The emerging use of DNA profiling, which causes human right and privacy violations, requires special measures to address such violations. In addition, it is essential to take measures to control or reduce the gaps between developed and developing countries regarding the use of DNA technology in their justice delivery systems. It is, therefore, essential to guide and control the use of technological discoveries so that they can bring benefits for all. If research related to genetics and forensic use of DNA data in the justice delivery system is not controlled, protracted controversy and counterproductive inter-jurisdictional conflict

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76 Jasanoff, above n 10, 339.
77 Ibid.
may arise. Therefore, national and international measures are potentially important in order to control misuse and also to ensure proper use of genetic samples and related information in the justice delivery system.

It should be noted that the study of human genetic information and its use does not necessarily contradict support for pro-social technological development for the forensic purposes. Genetic technology is similar to any other technology in that it has both merits and demerits. The purpose of this study is not to develop any completely new philosophy about how to deal with challenges associated with human genetic material and information; rather it addresses a few issues, some mechanisms or solutions that that could guarantee for the proper management of human genetic information and also ensure the appropriate use of DNA technology.

In the post-September 11 world, concepts of security and privacy have been redefined. Many new security measures are routinely taken worldwide that clearly contravene traditional concepts of privacy. Identifying personal information, such as fingerprints and blood samples, are collected to make comprehensive databases of personal information (of citizens, visitors and/or foreigners) to enhance national security. It is really difficult to determine, however, if large scale human genetic projects or their databases could be utilised in the fight against terrorism in the future instead of focusing purely on medical research. Generally, all individuals have the right to determine what information should be collected about themselves and how it should be used. However, no right, including that of privacy, is absolute, but rather is subject to a number of conditions. When it comes to the handling of sensitive information like genetic data, extra attention is required. Privacy is always an important human rights issue and current trends in genetic research have raised several new questions. An appropriate international legislative or other mechanism has to be sought in order to solve the new challenges related to genetic information. Therefore, the main goal of this thesis is to review the challenges and to recommend some mechanisms to protect human genetic material and information.
CHAPTER 2

2.1 GENERAL BACKGROUND AND DISCUSSION

2.1.1 INTRODUCTION

This thesis is a combined study of law and genetic science. It is therefore critical to pinpoint some terminologies related to genetic information in the field of legal study. This chapter will concentrate on key terms or introductory ideas about human genetic information, such as DNA and its brief scientific development, and DNA Profiling and its various features. The purpose of this chapter is to provide a clear understanding of the background information relating to the issues identified by this research (that is, human rights and privacy violations). It should be noted from the outset that this chapter does not intend to discuss these issues as it will be dealt with in chapters 3, 5, 6 and 7. Rather, it sets out a brief account about how research relating to human genetic information has increased internationally in recent years through technological development. The discussion also addresses the nature of threats that are involved in such developments (such as, the use of DNA profiling in the justice delivery system and its associated challenges). It also highlights the significance of human genetic information in the course of the case investigation process, for instance the potential of DNA profiling in detecting the offenders with some precision. At the introductory stage, the discussion will also give an overview of the justification and foundation for this research.

In order to analyse the ideas sequentially, this chapter is organised into six different sections. Section 2.1.2 begins with the basis of DNA — a brief scientific background. The discussion also includes (in sub-section 2.1.2.4) the basics of human genetic information. Section 2.1.3 identifies the discovery and development of DNA profiling. Subsequently, section 2.1.4 looks at the significance of its forensic use. Section 2.1.5 then provides a description of the current development of forensic DNA databases (that is, the existing scenario of DNA profiling databases in the international context). Finally, section 2.1.6 concludes by looking at the issues with regards to human rights and privacy violations as well as related concerns in the process of the administration of justice.
2.1.2 HUMAN GENETICS: THE BASIS OF DNA PROFILING

2.1.2.1 A Brief Scientific Background of DNA

This section will discuss DNA and provide brief scientific background. It will also provide a foundation for further discussions on issues related to human genetics (more particularly issues regarding the forensic use of DNA profiling and databases) that are going to be addressed in the later chapters of this study.

2.1.2.2 What is DNA?

(a) Terminology and Definition

DNA or deoxyribonucleic acid contains the hereditary materials that are used in the development and functioning of all known living organisms. In other words the instructions that are needed to direct the activities of human body cells are contained within the DNA. The reason it is called ‘deoxyribonucleic acid’ is because it is an acid that is found in every cell of the human body which contains lots of sugar group (ribo) attached to it and each sugar group has a missing oxygen molecule (deoxy). It contains genetic instructions which pass from adult organisms to their offspring during reproduction. In other words, DNA is the molecule that encodes and carries the entire hereditary information of each individual in almost every cell of the body and which is the same in each cell. With the exception of identical twins, the DNA of every individual is unique. The exception arises from the fact that monozygotic or

80 Spencer Wells, Deep Ancestry: Inside the Genographic Project: The Landmark DNA Quest to Decipher our Distant Past (National Geographic Society, 2006) 14. See also Misra, above n 78; Australian Law Reform Commission, Essentially Yours, above n 8, 112 [2.4].
identical twins come from the same fertilized egg and, thus, they share ... identical DNA profiles, unlike dizygotic (DZ) twins which ‘arise from a pair of separate eggs, fertilized by two different sperm [and] ... [a]s a result, share only 50% of DNA sequence variation, on average.'

Samuel K Moore has described the composition of DNA as being:

made up of units called nucleotides and each of the nucleotides consists of a deoxy-ribose sugar, a phosphate, and one of four chemicals which are called bases — adenine, guanine, cytosine, or thymine. ... The nucleotides are the backbone of DNA.

Therefore DNA is the chemical store-house of an individual’s genetic material. It is a tiny interconnected thread-like molecule, a double helix that contains all the information required for the life process. It is also referred to as the ‘hereditary blue print’ and it does not change throughout a person’s lifetime. DNA is the fundamental building block for an individual’s entire genetic makeup. All hereditary characteristics of an individual (such as eye colour, hair colour, blood group and so on) are determined by the information that is contained in the DNA molecule and such information passes from one generation to the next. As DNA is

88 Giggins, above n 82, 3.
90 Newman and Newman, above n 89. See also National Forensic DNA Profiling Laboratory, ‘Introduction to Forensic DNA Profiling’ (Multi-Sectoral Programme on Violence Against Women, Ministry of Women and Children Affairs, Government of the People’s Republic of Bangladesh, November 2006) 7–8; see also Sharif Akhteruzzaman, DNA Technology in Criminal Justice System (11 October 2011) National Forensic DNA Profiling Laboratory, Dhaka Medical College [1] <www.jatibd.org/DNA.doc>. Note: their manifestation in the subject, however, can be disguised by
present in almost every cell, almost any biological sample (like blood, saliva, semen, hair, teeth and bone tissue) is, therefore, a potential source of DNA. Section 7 of Genetic Privacy and Non-discrimination Bill 1988 of Australia has defined the term DNA as a ‘genetic material that is composed of nucleotides that encode genetic information’.91

2.1.2.3 Its Brief Scientific Background

(a) Location of DNA

The human body is a multi-cellular organism. It is composed of approximately 100 trillion cells, and has about two hundred different kinds of cells.92 A ‘cell’ is the smallest unit93 of an organism which represent a self-stabilising system, and it contains all the information required for the life process and reproduction. Cells integrate the activity of the genes and their products into a functional entity to form the basic units of all living organisms.94 Every cell in the human body contains a ‘nucleus’ with the exception of mature red blood cells.95 Within the nucleus there are a tightly curled fibre like structures, which are known as ‘chromosomes’96 or the ‘coloured bodies’ (a term derived from the Greek word chromo means ‘coloured’ and soma means body’).97 Each chromosome is ‘a linear structure found in all cells of an organism’.98 Normally, there are 46 chromosomes in every cell of human body,99 arranged in 23 pairs. One of those 23 pairs consists of the ‘sex chromosomes’, with the presence of two X chromosomes determining a child is the use of coloured contact lenses and hair dye – but matching the samples accurately identifies the person.

91 Genetic Privacy and Non-discrimination Bill 1998 (Cth) s 7 (‘GPND Bill’).
96 Australian Law Reform Commission, Essentially Yours, above n 8, 111 [2.2]; see also US Department of Energy Genome Research Programs, ‘Genomics and Its Impact on Science and Society’, above n 79.
99 Chiras, above n 93, 326; see also Faller and Schünke, above n 95, 11. The exception is of course the reproductive cells (ova and sperm) which contain a single set of chromosomes (23) ready to combine to form the new single human individual at fertilisation.
female, and one Y determining a child is male (though there are other combinations, such as XXY (Klinefelter’s Syndrome or XYY syndrome). The other 22 are homologous, referred to as ‘autosomal chromosomes’.\footnote{A J Nair, Basics of Biotechnology (Laxmi Publications, 2\textsuperscript{nd} ed, 2005); see also Faller and Schünke above n 95, 11.} A child inherits one set of chromosomes (23) from his or her mother and another (a further 23 chromosomes) from his or her father, and a parent passes one set of his or her chromosomes down to each of his or her children.\footnote{Ron C Michaelis, Robert G Flanders and Paul H Wulff, A Litigator’s Guide to DNA From the Laboratory to the Courtroom (Elsevier, 2008) 2–3.} Chromosomes differ in their shape and size, banding pattern, and location of the centromere\footnote{Julia E Richards and R Scott Hawley, The Human Genome: A User’s Guide (Academic Press, 3\textsuperscript{rd} ed, 2011) 59–60; see also Chiras, above n 93, 326; Faller and Schünke, above n 95.} (that is the constricted region of linear chromosomes, joining the two sister chromatids that make up an X-shaped chromosome).\footnote{Although this constriction is called the centromere, it usually is not located exactly in the center of the chromosome — in some cases it is located near the middle of some chromosomes and in other cases almost at the chromosome’s end. The regions on either side of the centromere are referred to as the chromosome’s arms. Centromeres help to keep chromosomes properly aligned during the complex process of cell division, for further details see Richards and Hawley, above n 102, 58–60; see also Genome.gov, National Human Genome Research Institute and National Institute of Health, Chromosomes (20 November 2011) <http://www.genome.gov/26524120#al-4>.}

‘Each chromosome contains a strand of tightly coiled DNA. The DNA strand is divided into small units called ‘genes’\footnote{The word comes from the Greek ‘Genos’, meaning ‘birth, family, race’. Since 1911 the English term has been ‘gene’ and it denotes an element of the chromosome that is responsible for an hereditary factor. For further details, see Pierre-Henri Gouyon, Jean-Pierre Henry and Jacques Arnould, Gene Avatars: The Neo-Darwinian Theory of Evolution (Tiitu Ojasoo trans, Kluwer Academic Publishers, 2002) 153; see also Genome.gov, National Human Genome Research Institute and National Institute of Health, 1909: The Word Gene Coined (October 5 2010) <http://www.genome.gov/25520244>; Pilnic, above n 98, 9–10.} and each gene occupies a particular site called its “locus”, plural “loci”)’ on the strand.\footnote{Alan Gunn, Essential Forensic Biology (John Wiley and Sons, 2\textsuperscript{nd} ed, 2009) 86.} Genes transmit genetic information through chromosomes.\footnote{Faller and Schünke, above n 95.} The chromosomes in the human body contain approximately 35000–45000 genes,\footnote{Gunn, above n 105.} and this complete set of genes is known as the ‘human genome’.\footnote{Ibid. See also Richards and Hawley, above n 102, 91.} Therefore, each gene ‘with a specific location and consisting of the inherited genetic material known as DNA’.\footnote{Benjamin Lewin et al, Lewin’s Essential Genes (Jones and Bartlett Publishers, 2\textsuperscript{nd} ed, 2010) 3.} DNA serves as the building blocks of genes which are
the units of heredity. DNA is located inside the cell nucleus\textsuperscript{111} and tightly packed with chromosomes. If the DNA inside one cell was stretched out end to end, it would be approximately 1.8 metres (or six feet) long.\textsuperscript{112}

Any biological sample from a human body (apart from sex cells) taken at any time can reveal the genetic information about that person.\textsuperscript{113} This means that a single sample of blood, hair, saliva or any other biological material can be analysed and re-analysed\textsuperscript{114} to obtain genetic information about a person, his or her parents, ancestors or heritage as well as his or her potential future offspring.

\textbf{(b) Structure of DNA}

The following figure represents the whole structure of DNA and it has been cited from the \textit{Glossary of the National Human Genome Research Institute} of the US.\textsuperscript{115}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{structure_of_dna}
\caption{The Structure of DNA\textsuperscript{116}}
\end{figure}

DNA consists of two molecules joined in a double helix and it can be visualised as a twisted ladder. The ladder sides consist of smaller sugar and phosphate molecules.\textsuperscript{117}

\begin{flushleft}
\textsuperscript{111} Except for the comparatively small amount of mitochondrial DNA (mtDNA).
\textsuperscript{114} Pridmore, above n 113.
\textsuperscript{116} Ibid.
\end{flushleft}
Each strand of the ladder consists of four different sub-units or bases. These bases are: adenine (A), guanine (G), thymine (T) and cytosine (C) and are represented by four letters (A, G, T and C). Pairs of these bases make up the rungs of the ladder.\textsuperscript{118} Adenine can only be paired with thymine, and cytosine can only be paired with guanine.\textsuperscript{119} ‘The human genome contains roughly 3 billion bp [base pairs]’.\textsuperscript{120} The information contained in DNA is the sequence of these four letters (called the genetic alphabet) along the strand. This basic structure DNA is the same for all organisms; the differences are in the length of the code and the order of the letters. For example, the sequence ACGCT represents different information than the sequence AGTCC, in the same way that the word STAR has a different meaning than ARTS or RATS even though they use the same letters.\textsuperscript{121} As Pilnic explains:

\begin{quote}
[H]uman DNA, for example, is not fundamentally different to viral DNA, except in the way these four bases are ordered and repeated. Just as words only make sense in phrases or sentences, a length of DNA becomes meaningful when it makes up the recipe for a gene.\textsuperscript{122}
\end{quote}

DNA is also popularly known as the ‘genetic code’ or ‘genetic program’, a program that is coded by those four bases, or sub-units.\textsuperscript{123} That means that when the four bases of DNA are arranged in triplets (codons) in various orders, it represents the ‘genetic code’. The four bases or sub-units direct the cells ‘to construct proteins which provide structure to and mediate chemical reactions within a cell’.\textsuperscript{124} These proteins therefore ‘determine the characteristics of cells, which in turn collectively

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{118} Alice Wexler, Mapping Fate: A Memoir of Family, Risk, and Genetic Research (University of California Press, 1996) 93.
\item \textsuperscript{120} DOE Human Genome Program, 'Primer on Molecular Genetics' (ORNL/M--2026, US Department of Energy, Office of Energy Research, Office of Health and Environmental Research, April 1992) 4.
\item \textsuperscript{121} National Forensic DNA Profiling Laboratory, above n 90.
\item \textsuperscript{122} Pilnic, above n 98.
\item \textsuperscript{123} Hocking, above n 83.
\end{itemize}
\end{footnotesize}
determine the characteristics of the individual. For instance, the sequence ATCGTT might determine blue eyes, while ATCGCT might determine brown. Likewise, changes or mutations which occur in that sequence of DNA code have been known to cause genetic defects, abnormalities, and inherited diseases or a predisposition to a particular disease. Therefore, the basis of genetic disease is based on changes in the DNA sequence. Moreover each pair of autosomal homologous chromosomes carries the same sets of genes. Although they are homologous and potentially have identical functions, some of the genes have a slightly different DNA sequence. Between individuals only 0.1 per cent of the precise DNA sequence varies; the remaining 99.9 per cent of the DNA sequence is identical.

(c) Discovery of DNA

The beginning of modern genetic science is considered to be the publication of Charles Darwin’s ‘Origin of Species’ in 1859, where he outlined ‘the theory of evolution’. ‘Darwin termed the hypothetical process involved ‘natural selection’. The main argument of this theory is that all life forms are not independently created; rather they are related and are descended from a common ancestor, and their variation is explained by this process. Later, in 1865, the Czech monk Gregor Mendel completed a series of experiments with peas and developed the concept of ‘heredity’. He was able to show that there are certain traits in the peas,
such as their shape or colour, and that ‘these characteristics are inherited by a special “factors” [what] we now call genes’.\textsuperscript{134} Mendel’s findings (his two laws of genetics or what is now termed Mendelian genetics) were followed by a number of other hallmark discoveries.\textsuperscript{135} In 1905, William Bateson\textsuperscript{136} coined the term genetics (from the Greek, means ‘to give birth’) and in 1909 Wilhelm Johanssen used the term gene to describe the Mendelian units of heredity.\textsuperscript{137} Johanssen also made the distinction between ‘phenotype’ (an organism’s outward appearance) and ‘genotype’ (its genetic traits).\textsuperscript{138}

The significance of DNA became clear in 1953 with the major contribution of James Dewey Watson (a biologist from Indiana University)\textsuperscript{139} and Francis Crick (a physicist at the Medical Research Council Unit for the Study of the Molecular Structure of Biological Systems, Cavendish Laboratory, Cambridge),\textsuperscript{140} and that of Maurice Wilkins (a New Zealand born physicist) and Rosalind Franklin (a 30 year old English chemist).\textsuperscript{141} The significance of their work was recognised by the Nobel Committee and Watson, Crick and Wilkins were jointly awarded the Nobel Prize in Physiology or Medicine in 1962 for their efforts (‘for their discoveries concerning the molecular structure of nucleic acids and its significance for information transfer in living material’).\textsuperscript{142} However, Franklin was not nominated nor would her contribution have been able to be so acknowledged due to her early death from

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\textsuperscript{134} Nigel English, \textit{Revise for GCSE Science: Higher AQA Modular} (Heinemann, 1\textsuperscript{st} ed, 2002) 32.

\textsuperscript{135} Kristine Barlow-Stewart, 'The Human Genetic Code-The Human Genome Project and Beyond' (Centre for Genetics Education, Australasian Genetics Resource Book, 6th Ed, June 2007) 1–2.


\textsuperscript{139} Francis Leroy, \textit{A Century of Nobel Prizes Recipients: Chemistry, Physics, and Medicine} (CRC Press, 2003) 287; see also Michel Morange and Matthew Cobb, \textit{A History of Molecular Biology} (Michel Morange and Matthew Cobb trans, Harvard University Press, 2000) 105–8; Sanderson, above n 137, 50.


\textsuperscript{141} Watson, \textit{Molecular Biology of the Gene}, above n 132, 74; see also Crick, ‘The Double Helix’, above n 140; McCabe, McCabe and McKusick, above n 140, 14–15.

cancer. Watson and Crick published their discovery in the journal *Nature*, where they presented the double helix structure of DNA that carries genetic information from one generation to the other. This structure of DNA, which was ‘based on X-ray diffraction studies and molecular model building, explained for the first time not only how this molecule could encode biological information but also how the information could be precisely replicated during cell division’. Watson and Crick had therefore discovered DNA as the ‘secret of life’. In this regards Macgregor and Poon rightly pointed out that:

1953 witnessed the birth of a science icon with the publications of James Watson and Francis Crick’s proposal of a double helix structure of DNA ... The proposal rationalized and accommodated a great deal of current experimental information and pointed the way to other experiments that could verify it. The process of verification provided additional revelations about the molecular mechanisms of cellular processes, and it provided a model on which many other ideas could be based. ... [The discovery also] offered an entirely new way of understanding the molecular mechanisms underlying many cellular processes, such as cell division, genetic inheritance, and protein synthesis.

Some other scientists had turned their efforts towards elucidating the structure of DNA in the early 1950s, such as Linus Pauling, a chemist who received the 1954 Nobel Prize in Chemistry for his research into the nature of chemical bonding and its application to clarifying the structure of complex substances. Additionally, Erwin Chargaff, a professor of biochemistry at Columbia University, contributed by discovering DNA base composition (that is, the molar base ratios of A equal T and G equal C), however he failed to see base pairing.

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143 For further details, see Lynne Osman Elkin, 'Rosalind Franklin and the Double Helix' (March 2003) *Physics Today* 42–8.
148 Ibid 462.
Finally, after realising the future of the potentiality of the human gene, in 1990 the Human Genome Project (HGP) was established as an international research effort and completed in 2003.\textsuperscript{150} The goal was to produce a variety of biological maps of human chromosomes and determine the complete chemical sequence of human DNA — the sequence of which genes are composed — and thus be able to use such knowledge in the diagnosis and prediction of genetic conditions, which indeed has been greatly assisted by the research.\textsuperscript{151} However, some time earlier, on 10 May 1998, J Craig Venter, a biologist and the director of the Institute for Genomic Research (TIGR), announced that within three years he would be able to discover the complete genetic code of human life instead of seven years that it would take the US government’s HGP.\textsuperscript{152} Subsequently he formed a private company, ‘Celera’ and set himself to achieve this highly ambitious goal and he published his completed sequence of the human genome in February 2001 in the journal, ‘Science’.\textsuperscript{153} He recounted this extraordinary achievement in his book, ‘A Life Decoded’.\textsuperscript{154}

The National Human Genome Research Institute at the National Institutes of Health (under a leadership team headed by Francis Collins) and Celera never managed to combine their efforts. Indeed, two books exist due to the existence of their rival teams,\textsuperscript{155} who ‘were unable to mend their differences and pool their data’.\textsuperscript{156} The


\textsuperscript{151} Ibid.


\textsuperscript{153} Oliver, above n 152, 32; see also J Craig Venter et al, 'The Sequence of the Human Genome' (2001) 291 Science 1304,1304–51; McCabe, McCabe and McKusick, above n 140, 21–2.

\textsuperscript{154} J Craig Venter, A Life Decoded: My Genome: My Life (Viking Adult, 2007).

\textsuperscript{155} One is the genome sequence compiled by J Craig Venter and colleagues at Celera Genomics, a biotech company started in 1998 in Rockville, Maryland. The other appears in the 15 February issue of Nature and was produced by the International Human Genome sequencing consortium, see generally Robidoux, above n 150, 3–6.

rivalry may, however, have served to make the efforts mobilised within the public institutions ‘unexpectedly unified’. 157

The discovery of DNA has a significant impact on genetics in particular and biology in general. This discovery could be termed as a ‘pearl’ because this very valuable knowledge is essentially ‘hidden’ as a single DNA molecule is far too small to be seen by the naked eye and yet contains a virtually infinite number of different genetic messages. It is the most central substance in the workings of all life on earth. 158 DNA forms the basis of biological inheritance of every human being. 159

(d) Function and Significance of DNA

Human bodies are composed of ‘billions of individual cells and DNA is the control-centre of each and every cell’. 160 DNA contains the code for the structures and properties of proteins and therefore it determines the cells behaviour, function, and structure. Human characteristics, including various genetic diseases can be determined through DNA testing. 161 The numerous biological ‘instructions’ are encoded in the DNA and this enables various developmental and functional processes to occur in the biological organism. 162 Here Calladine and Drew have made an elegant analogy for DNA, where DNA in the human body functions like a computer tape, which can store many programs in order to run a large computer. 163 Genetic information about any organism is contained in the DNA molecules of that organism. This information provides exact instructions for the creation and functioning of the organism. DNA molecules of all organisms contain the same basic physical and chemical components, arranged in different sequences and this stores the genetic material. The main role of DNA molecules is the long-term storage of information.

157 Shreeve, above n 152.
160 Calladine and Drew, above n 158, 2.
162 Hope, above n 146, 1.
163 Calladine and Drew, above n 158.
DNA is a valuable resource for medical, legal and social applications for which DNA testing is generally used. For medical purposes, DNA can provide information about several thousand genetic conditions and diseases. Another important feature of DNA is that it can identify a person and also indicate something about possible human behaviour. The sequence of DNA is unique to every human being (except identical twins). It is identical within all tissues (that is, whether it is extracted from hair bulbs, white blood cells, or a semen specimen) of the same body.\textsuperscript{164} It is similar to a ‘barcode’ for identification.\textsuperscript{165} This principle of ‘individual uniqueness and identical DNA structure within all tissues of the same body provide the basis for DNA profiling’.\textsuperscript{166} Almost all criminal justice systems use this method of identification because the results of the tests are generally ten to one hundred times more accurate than is required by the courts. Among the most significant applications of DNA technology are genetic testing, genetic engineering, cloning, and DNA profiling or ‘fingerprinting’. In its subsequent chapters, this thesis will concentrate on the application of DNA profiling for justice delivery purposes.

The DNA sequence becomes understandable when it turns into information. All the concerns related to human DNA commences when it become easy to understand, use and access in the form of genetic information. The following section will discuss the basics of ‘human genetic information’, how it is useful as well as source of risk for humankind.

\textbf{2.1.2.4 The Basics of Human Genetic Information}

Upon considering the scientific background of DNA, it is now imperative to clearly outline what it is about ‘human genetic information’ that distinguishes it from other forms of health or personal information. This section discusses the meaning, nature and some basic features of ‘human genetic information’ which are available as a result of emerging technologies. Generally speaking, almost all information about human beings’ health, genes or heredity and physical characteristics is known as their ‘genetic information’. A person’s gender, race, and a number of other bodily features ‘are related, in whole or in part, to that person’s genetic inheritance’.

\begin{flushright}
\textsuperscript{164} Lorne T Kirby, \textit{DNA Fingerprinting: An Introduction} (Oxford University Press, 1993) 1.
\textsuperscript{165} Gunn, above n 105, 86.
\textsuperscript{166} Kirby, \textit{DNA Fingerprinting}, above n 164.
\textsuperscript{167} Australian Law Reform Commission, \textit{Essentially Yours}, above n 8, 129 [3.2].
\end{flushright}
predisposition to a number of genetic disorders, diseases or other kinds of health conditions can be identified using DNA analysis.

The following discussion will analyse the genetic material and information, their relationship, and if there is any differences between them. Later it will examine the meaning and definition of genetic information.

(a) Genetic Sample and Genetic Information

In general a clear distinction between the term ‘biological resources’ and ‘genetic material’ is made by the Convention of Biological Diversity, 1992 — ‘biological resources includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity’. On the other hand ‘Genetic material means any material of plant, animal, microbial or other origin containing functional units of heredity’. That means a biological resource is wider concept than the genetic material. Among these human genetic material is sub-unit of those materials.

Though human genetic samples or material and genetic information derive from the same source — human DNA — there are some differences between DNA samples or genetic material, and genetic information. A ‘DNA sample’ or ‘genetic material’ refers to all human biological specimens, such as human tissue, blood sample, semen, saliva, hair, nails or any other source of DNA from which genetic information are extracted. The Australian National Health and Medical Research Council (NHMRC) has defined the term ‘genetic material’ in the ‘National Statement on Ethical Conduct in Research Involving Humans’. According to this document, ‘genetic material’ means:

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169 There is a little distinction between ‘data’ and ‘information’. The word ‘data’ means insertion of symbols, signs or measures; on the other hand, the term ‘information’ refers to the human analysis and use of data to extract meaning from it. For the purpose of present discussion both the concepts have referred as having the same meaning.
170 National Statement on Ethical Conduct in Research Involving Humans, 1999 (issued by the National Health and Medical Research Council (NHMRC) in accordance with the NHMRC Act 1992 (Cth)).This statement is revoked and the ‘National Statement on Ethical Conduct in Human Research 2007’ is framed for the current human research guidelines. This original statement is archived and used for reference purposes only.
any source of DNA or RNA which can be tested to obtain genetic information. It thus includes cells, whether as single cells or as part of tissues, and extracted DNA and RNA.\textsuperscript{171}

Therefore, the information which is derived from that a genetic sample or source through the process of genetic analysis is called ‘genetic information’ (or DNA profiles\textsuperscript{172}). According to the view of Spinello, both genetic material (or the DNA sample or bodily source) and genetic information can be referred together as ‘genetic source material’.\textsuperscript{173} The derived genetic information can readily be stored in a hard copy form (for example, on paper in a file) or on any database. Currently all the collected human genetic information is stored in the ‘human genetic databases’\textsuperscript{174} as well as in the forensic DNA databases, depending on their purpose of collection. In addition, the collected genetic information can easily be preserved as well as used for a long time, unless it is destroyed, and if the sample provider consented for its unlimited use. Australian Law Reform Commission (ALRC) has defined the term genetic information which ‘includes both DNA sequence information as revealed by a genetic test and inferences that can be made from knowledge of the sequence.’\textsuperscript{175} A similar but more comprehensive definition is provided by the NHMRC, according to that definition, genetic information includes and or can relate to:

both DNA sequence information and inferences that can be made from knowledge of the sequence. ... information that allows inferences to be made about DNA sequence. ... a condition that is clinically apparent ... or latent.\textsuperscript{176}

In other words, it is information about someone’s DNA, his or her hereditary characteristics, and may include some diseases that can be determined by various genetic testing. It can also reveal sensitive information about his or her families. The

\textsuperscript{171} National Statement on Ethical Conduct in Research Involving Humans 1999 appendix 3. See also National Health and Medical Research Council, ‘An Information Paper’, above n 128, 9 [1.3].

\textsuperscript{172} ‘The DNA Profiles are digitised information and it is this digitised information that is stored electronically ... together with details of the person to whom it relates’; Jason M Swergold, ‘To Have and to Hold: The Future of DNA Retention in the United Kingdom' (2010) 33 Boston College International and Comparative Law Review 179, 179 [n 2].

\textsuperscript{173} Richard A Spinello, 'Property Rights in Genetic Information' (2004) 6(1) Ethics and Information Technology 29, 30.

\textsuperscript{174} ‘The term “human genetic database” may refer to many kinds of collections of genetic samples and genetic and other health information. Genetic samples contained in research collections can include a wide range of human biological materials such as extracted DNA, body fluids, cells and sections of tissue.’; Australian Law Reform Commission, Exercises Yours, above n 8, 470–71[18.7].

\textsuperscript{175} Australian Law Reform Commission, Protection of Human Genetic Information, Report No 26, 2001) [86].

\textsuperscript{176} National Health and Medical Research Council, ‘An Information Paper’, above n 128.
wider application of genetic technology has made the whole process easier and faster.

Stulic argued that very few attempts have been made in Australia to provide ‘a wider legal definition of genetic information or to articulate a legal perspective of DNA’, but this inadequacy is in fact international one. Nevertheless, some national legislation and at least one case have defined the term ‘genetic information’ from a legislative point of view. Section 7 of the draft Genetic Privacy and Non-Discrimination Bill 1998 has defined ‘genetic information’ as:

> Genetic information means (a) information from a DNA sample about genotypes; or (b) information from mutation analysis; or (c) information about nucleotide and polypeptide sequence(s) or; (d) information about gene(s) or gene products.\(^{178}\)

However, the Bill has not been enacted by the Parliament of the Commonwealth of Australia. Rather the Privacy Act 1988 was amended and the Privacy Legislation Amendment (PLA) Act 2006 (Cth) introduced. The PLA Act amended the definition of ‘health information’ and ‘sensitive information’ in the Privacy Act to expressly include genetic information.\(^{179}\) Under this law, health information means (among other information) ‘genetic information about an individual in a form that is, or could be, predictive of the health of the individual or a genetic relative of the individual’\(^ {180}\). Similarly, the US Government has passed Executive Order 13145 in 2000 that adopts a policy of not discriminating in federal employment on the basis of genetic information. This Order has defined the term ‘Protected Genetic Information’. According to this Order, ‘Protected Genetic Information’ means:

- A. information about an individual’s genetic tests;
- B. information about the genetic tests of an individual’s family members; or
- C. information about the occurrence of a disease, or medical condition or disorder in family members of the individual.\(^ {181}\)

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177 Stulic, above n 72, [8].
178 GPND Bill 1998 s 7.
179 Privacy Legislation Amendment Act (No 99) 2006 (Cth).
180 Privacy Act 1988 (Cth) s 6(1) Health Information (d); Privacy Legislation Amendment Act s 3 sch 2.
181 Executive Order 13145 65 Fed Reg 6877, 6877–6880 (10 February 2000), §2(1–201) (e) (1).
Further, the US *Genetic Information and Non-discrimination Act* has defined the term in almost the same manner. According to this Act, ‘genetic information’ is information about the genetic tests of any individual, his or her family members, and also the manifestation of a disease or disorder in such family members.\(^{182}\) One judicial attempt was made by Heerey J in the case of *Genetics Institute, Inc v Kirin-Amgen*\(^ {183}\) to provide a legal definition of genetic material and information, or DNA:

> The genetic material of any organism is the substance that carries the information determining the properties of that organism. It is the information contained in the genetic material that determines, for example, the colour of flowers and that fish have gills. The genetic material is also responsible for transferring the genetic information from parent to progeny. All the genetic information of an organism is collectively referred to as its genome. The genetic material in all organisms, apart from viruses, is a form of nucleic acid called DNA (short for deoxyribonucleic acid).\(^ {184}\)

This is the general scenario of most of the countries. All the above mentioned pieces of national legislation and a judicial decision have provided a legal phenomenon of the term ‘genetic information’ and such determination of the legal scope of ‘genetic information’ is very significant for the protection of genetic privacy. However, as the concept of genetic information is a newly emerged idea and many countries are not sufficiently aware of its significance. Therefore, the conceptual framework from the legislative point of view has not yet developed in most countries, especially the developing ones. No Bangladeshi law, for instance, has defined the ideas of ‘genetic sample’ and ‘genetic information’. Finally, there is also a lack of a well-defined common standard regarding the idea of human genetic sample and or information in any international convention or treaty.

After analysing all these definition, it can be said that genetic samples and any information derived from them are vital for human beings and such information is contributing significantly to changing the lives of human beings.\(^ {185}\) The following section will analyse about these life changing types of characteristics that contain human genetic information.

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\(^{184}\) Ibid.

(b) Characteristics of Genetic Information

From the above discussion it has been highlighted that the whole idea of human genetic information (which is derived from human genetic samples) comprises some basic characteristics or features. Therefore, there are several characteristics of genetic information which make it unique from other kinds of medical or health information. For the purposes of the argument presented in this discussion, it is worth noting here some of the distinctive characteristics of human genetic information.

Familial and Social Nature of Genetic Information

As the DNA sample or genetic material is collected from human bodies, it is therefore, highly intimate and personal. Genetic information is considered uniquely private and personal information. Though such information is personal, one of its vital features is that it can reveal information not only about an individual but also information about his or her family members, in both succeeding and preceding generations. Therefore, it can reveal information about ‘a person’s parents, siblings, and children’. For example, if someone is a carrier of cystic fibrosis, it implies that one of his or her parents is also a carrier of that disease and that a sibling may be a carrier. In some cases genetic information may even be pertinent for some ethnic minority or racial group. For instance, ‘Tay-Sachs disease is primarily (but not exclusively) found in persons of European Jewish descent’. On the other hand, sickle cell anemia, primarily affects persons of Spanish-speaking regions (South America, Cuba, Central America); Saudi Arabia; India; and Mediterranean countries such as Turkey, Greece, and Italy and black African descent, while ‘haemochromatosis is very common in persons of northern European descent’. The familial and social nature of human genetic information can thus affect how family members and members of particular racial groups perceive and relate to each other.

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188 Weisbrot, Spiteri and Carney, above n 187.
189 Ibid.
191 Weisbrot, Spiteri and Carney, above n 187.
192 Ibid.
Genetic Information is Unique and can Reveal Information about Person's Identity

Another important characteristic is that genetic information is unique and can reveal individual’s identity. The mechanism of DNA Profiling is very useful in case of detecting criminals, identifying missing or deceased persons, and mass disaster victims, and paternity testing more particularly. Because, each human being has a unique DNA sequence and this very uniqueness is a major contributor to their individuality. Therefore, genetic analysis of DNA samples has the potential to reveal information about individual identity and differentiate one person from another. This analysis is made possible by the fact that an individual’s DNA is unique to that person, except for genetically identical twins.193 This DNA analysis process is commonly known as ‘DNA fingerprinting’ or ‘DNA profiling’.194 The potential and pitfalls of this technique and its applications will be examined in the following chapters.

Genetic Information as a Human’s Future Diary

Mostly because of the complex interaction between human genes, lifestyle and environmental factors, numerous genetic disorders are multi-factorial by nature. In these circumstances, the role of the genetic information is that it can reveal the possibilities of diseases or disorders, rather than the certainties. For example, although ‘BRAC1 testing may establish that a woman has the particular genetic mutation associated with breast cancer, this does not mean that she will definitely contract that disease. It simply means that the probability of her doing so increases.’195 As a result, genetic information can only predict whether an individual has an increased susceptibility to develop a particular disease or not.196 For some conditions, however, genetic testing can do so with great accuracy a long time before the symptoms appear (for example, Huntington's). Such tests cannot predict exactly when symptoms will develop and also unable to predict sometimes which features of the disorder will occur,197 or their severity or exact progression of the disease.198

193 Hocking, above n 83.
194 Section 2.1.3.2 of this Chapter.
196 Ibid.
197 National Health and Medical Research Council, ‘An Information Paper’, above n 128, 13 [1.7].
198 Even so-called simple monogenic diseases vary in their expression and several ‘modifier’ genes have been discovered in some instances, for further details see Heidi Chial, 'Rare Genetic Disorders:
Genetic information, therefore, can be predictive of future health as it can reveal a significant amount of information about present and possible (in some cases probable) future physical as well as mental health conditions of a person and members of his or her family, by identifying a person’s predisposition to, or carrier status for certain diseases or disorders. George J Annas has thus, portrayed ‘genetic information’ as similar to one’s ‘future diary’ (though a ‘probabilistic’ one). 199 It must be recalled, however, that a degree of inexactitude remains, depending on the gene/s and the characteristic/s or disease selected. As Brant Pridmore has noted:

[A] person’s genetic characteristics influence many of the things (like physical appearance and some psychological characteristics) that affect his or her sense of personal identity; by-and-large, a person's genetic characteristics are with him or her for life — they cannot be changed; some genetic testing information has great predictive power about a person’s future experiences ... [but] in making predictions about the future, genetic testing information often only tells us about the chances that something will occur — it does not tell us that it certainly will.200

**Genetic Information is Sensitive**

Genetic information is also perceived as ‘sensitive information’, because such information can be used to indicate a predisposition towards certain health conditions201 and may predict (within a varying degree of statistical certainty) future health conditions of an individual and members of his or her family. Genetic information obtained by genetic testing can also be used due to the knowledge of the genome sequence to predict the incidences of particular diseases or disorders in the family However, there is a debate about the issue of whether genetic information is so unique and sensitive that it requires a special protection against threats to privacy.

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200 Pridmore, above n 113.

201 Soraj Hongladarom argued that: [S]ome genetic information may clearly be sensitive, such as the gene that has been found to be responsible for schizophrenia. If the responsible gene is found in a database of certain individuals, then given the stigma accorded to those who are prone to the disease, at least in some cultures, this should be enough to conclude that genetic information is part of the sensitive data that should be protected. Hence the attempt to protect privacy should also include the protection of genetic data.

and against its misuse, or not. Many scholars believe that genetic data should be considered like all other medical data\textsuperscript{202} and should have the same standards of privacy protection. However, others believe that due to its sensitive nature, genetic information is distinct from other health and medical information. For instance, one of the UNESCO declarations, namely the \textit{International Declaration on Human Genetic Data},\textsuperscript{203} has recognised the special status of genetic data on the basis of its sensitive nature\textsuperscript{204} and it also requires member states to provide protection for such kinds of sensitive information. Due to its sensitive nature, genetic data may have significant impact on the family, their generations, in some cases on the whole groups or communities. Therefore, special measures are needed to protect genetic privacy and to prevent its misuse.

Through the increasingly widespread use of genetic technology, genetic testing and DNA sample analysis have become easier and more publicly available. Genetic information is very significant since it can provide data on the current health conditions of an individual as well as open an horizon into his or her future, in regard to predisposition to certain diseases, and potential for inheritance of genetic defects both in the person (whether manifested or not) and possible risk of transmission to the next generation. It is also a unique source of health information a person’s ancestors, descendants and lateral relatives. Such information is also considered as a useful tool by employers and insurers. Hence the privacy concerns frequently expressed. For employers, such information could be used to predict future health risks (and possible associated costs) of potential employees; while for insurers it could be used to identify high risk individuals among those who desire insurance coverage for life or health, or their relatives. Very often much interest has been expressed in the results of individual genetic tests by those third parties.\textsuperscript{205} Thus knowledge of such information (among potential employers or insurers) could result in an individual’s failure to gain employment or life, medical, income or other

\textsuperscript{202} Søren Holm, ‘There is Nothing Special About Genetic Information ’ in Alison K Thompson and Ruth F Chadwick (eds), \textit{Genetic Information: Acquisition, Access, and Control} (Kluwer Academic, 1999) 97, 99.

\textsuperscript{203} For further details see section 3.1.3.2 of Chapter 3.

\textsuperscript{204} \textit{International Declaration on Human Genetic Data}, Records of General Conference of UNESCO, Res 15, 32\textsuperscript{nd} sess, 22\textsuperscript{nd} pln mtg, vol I, ch IV, UN Doc 32C/29 Add 2 (adopted 16 October 2003) (‘\textit{IDHGD}’), preamble [6].

insurance. Generally disclosure of such information is already often required by applicants for insurance. Consequently, it is important to protect the wider use of human genetic information. Close consideration must be given to the handling of such information.

2.1.3 DISCOVERY AND DEVELOPMENT OF DNA PROFILING

2.1.3.1 History and Background

(a) Early Markers

Over the past two decades the development and application of genetics (that is, DNA profiling technology) has revolutionised forensic science. This advancement in the forensic science discipline ‘has great additional potential to help law enforcement in identifying criminals’. In the past when a crime was committed, the investigator collected information and evidence from a number of sources, such as witnesses, various kinds of physical evidence (fingerprint, shoe print and so on). Conventionally, in 1900 in his studies on the patterns of agglutination between red blood cells and serum of different healthy individuals, Karl Landsteiner effectively described the ABO blood group system, and in 1940 he discovered the Rhesus factor. The use and analysis of ABO (and Rhesus positive/ Rhesus negative) blood groups served the purpose of identification. Identification techniques based on variations on serum proteins and red blood cell enzymes were used and also ‘the human leukocyte antigen system’ until the 1960s. However, these systems ‘have a relatively low exclusion power’ and also they suffer from some limitations, such as it is much more difficult to get a reliable result from blood stains or body fluid

208 Kobilinskiy, Liotti and Oeser-Sweat, above n 24, 1–5.
collected from a crime scene than from a venipuncture sample. During the 1960s and 1970s further developments, particularly in molecular biology have occurred. This includes the identification of restriction enzymes, Sanger sequencing, and ‘southern blotting’. During the 1980s the highly polymorphic nature of the locus of material comprising markers in the DNA sequence was detected and reported by the US geneticists. Such loci of repeat sequences (and the repeats themselves) are ‘extremely variable between people’, and new genetic markers continue to be discovered. DNA techniques continue to improve and new techniques are adopted, enabling easier DNA analysis and increasing the reliability of DNA results.

(b) DNA Fingerprinting: Discovery and Application

Sir Alec Jeffreys, a British professor and geneticist pioneered what is now known as ‘DNA fingerprinting’ in 1984. Professor Jeffreys had an interest in studying human genetic variations, but initially he could not detect the genetic differences in human body. He and a number of his students first studied myoglobin genes in sea-dwelling mammals (seals). As Aronson recounts:

There they noticed that a particular 33-neocleotide sequence appeared in a variety of repetitive patterns that were present in almost all of the globins. Further examination revealed that these patterns seemed to be present in the

216 Easteal and Easteal, above n 215, 1.
218 Saad, above n 210.
In September 1984, Jeffreys and a graduate student, Vicky Wilson, took the initiative and set up an experiment to look for similar sequences in the human genome. They therefore analysed ‘the human myoglobin gene’ and while conducting this analysis, ‘they discovered a region consisting of a 33 base-pair (bp) sequence [which was] repeated four times within an intervening sequence (IVS)’. They referred ‘this tandem repeat’ ‘as a mini-satellites’ and noted that similar regions were hyper-variable ‘because the number of tandem repeats is variable both within a locus and between loci’. They also discovered a degree of commonality as ‘each repeat unit contains a smaller 16-bp core in common with other mini-satellites’. In their second paper (published in the journal *Nature* in 1985), they ‘concluded that the probability that two individuals would have the same DNA fingerprint was less than 1 in 33 billion (3×10^{-11}–5×10^{-19})’. Professor Jeffreys’ discovery therefore recognised that the repeating sequences (mini-satellites) are ‘highly variable’ and are ‘informative genetic markers’. In this regard Jobling and Gill remarked that the DNA revolution began with this discovery by Jeffreys. The ‘hypervariable multi-band patterns’ discernible by DNA analysis and so specifically characteristic of an individual became known as ‘DNA fingerprints’.

In the process of examining and comparing various samples of animal and human myoglobin using a multi-locus probe technique, Professor Jeffreys and a group of his students discovered DNA ‘fingerprints’, a term that appears to have been coined by Jeffreys and alludes to the markers as being as individual as those of traditional

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221 Kirby, *DNA Fingerprinting*, above n 164, 2.
222 Ibid.
223 Ibid.
224 Aronson, above n 219 where he cite information from Jeffreys, Wilson and Thein, ‘Hypervariable “Minisatellite” Regions in Human DNA’, above n 217. This figure was generated on the basis of a multi-locus probe (MLP) technique.
227 Ibid.
fingerprints. Utilising this and other later techniques of ‘genetic fingerprinting’, it is possible from DNA samples to extract unique markers and this ensures almost conclusive proof of individual identification. This substantial achievement was first applied as a forensic tool in the following two significant cases and contributed enormously securing justice in the mid-1980s in the UK. The successful application of DNA fingerprinting for the first time in the world for identification purposes provided a remarkable example for the world community.

**Sarbah v Home Office (UK)**

*Sarbah v Home Office (UK)* was the first practical test of DNA fingerprinting. In this instance, genetic fingerprinting was used to demonstrate to the UK Home Office that Christiana Sarbah and Andrew Sarbah were indeed mother and son. Andrew, who was of Ghanaian descent, had been born in London; but due to the separation of his parents he went back to Ghana with his father at the age of four. Later, at the age of eleven years, he returned to the UK to live with his mother. The dispute arose when the immigration authority doubted his identity as a British citizen. This case was solved by applying Jeffreys’ DNA fingerprinting method. Since it was first application of a new type of scientific evidence, therefore to get scientific credibility Jeffreys and his co-author sent a report of the Sarbah case to the journal, *Nature*. Through this case, DNA fingerprinting received its first major validation for the scientific community, the courts and public, regardless of a negative peer review by one referee.

**R v Colin Pitchfork**

Later this method was again applied, this time in a criminal case — the *Case of Colin Pitchfork*. In this case, a 15-year-old girl, Lynda Mann was found murdered near the village of Narborough (Leicestershire) in 1983. Due to the lack of evidence the

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231 Aronson, above n 219, 128.

232 Gunn, above n 105, 92.
case could not be resolved and was eventually wound down. Three years later, a similar type of crime was committed and again a 15 years old girl, Dawn Ashworth, was found raped and murdered in the nearby village of Enderby. This time the investigator’s had a local suspect — a 17-year old boy, Richard Buckland who worked at the Carlton Hayes Psychiatric Hospital. He confessed to the murder of Dawn Ashworth, not to that of Lynda Mann. Here again Professor Jeffreys applied his DNA ‘fingerprinting’ technique and along with other scientists from the Forensic Science Service (FSS) compared the semen samples from both murders with a blood sample from Richard Buckland, the initial suspect. The results proved that two of the murders were committed by a same person, but that in neither instance was Richard Buckland the offender. Thus he was eliminated from the case based on this DNA evidence. Again in order to catch the true offender, the Leicestershire police (undertaking the world’s first DNA-intelligence screen) asked a total of 5000 adult men within the vicinity of the crimes scenes to volunteer to provide DNA samples. Even after this mass screening, the murderer eluded them. Finally police arrested the real offender — Colin Pitchfork — after receiving a phone call from a lady who had overheard a conversation between the murderer and his friend, Lan Kelly, where they discussed how the murderer had escaped by convincing his friend to provide a sample in his name. Colin Pitchfork’s DNA was matched with the crime scene semen and he was sentenced to a life term for each of the two murders.233

Gradually, because of the success of this technology and its application in a number of areas (for example, paternity testing for child support, forensic investigations), private companies started to establish DNA-based profiling databases. Originally some UK and US based private companies, such as, the Lifecodes Corporation (USA) and Cellmark Diagnostics (UK and USA) offered DNA profiling and marketed their services to the public and, more particularly, to law enforcement agencies, which subsequently used services.234 In Australia there are also a small number of DNA profiling databases that are managed by private companies.235 This

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233 For further details see Aronson, above n 219, 128–30. See also Gunn above n 105, 92; William J Tilstone, Kathleen A Savage and Leigh A Clark, Encyclopedia of Forensic Science: An Encyclopedia of History, Methods, and Techniques (ABC-CLIO, 2006) 237.
235 Easteal and Easteal, above n 215, 3.
kind of service by the private companies was and is criticised widely.\textsuperscript{236} This indicates a cause of the subsequent growth of government DNA databases ie rather than relying on private companies. Subsequently the creation of state or government DNA profiling databases gained immense popularity worldwide over time. The British police first used DNA testing in criminal matters in 1985 in the \textit{Pitchfork Case} (above). In the UK, the government-owned FSS is today the largest supplier of forensic services to police in England and Wales. In the USA, the government started using DNA profiling in its Federal Bureau of Investigation (FBI) laboratory in late 1988.\textsuperscript{237} Other parts of the world gradually started to use the DNA profiling technology and it has gained great recognition over time in almost all legal systems.

2.1.3.2 DNA Profiling: An Overview

The DNA techniques have been further developed and recently a more sensitive and reproducible system — ‘DNA profiling’ — has been produced that uses a method involving Polymerase Chain Reaction (PCR)\textsuperscript{238} which compares short tandem repeat (STR)\textsuperscript{239} regions of human DNA.\textsuperscript{240} One advantage of these advanced techniques is that they are amenable to use for identification purposes. The evolution of the techniques used and the analysis applied continues to be a subject of research.

DNA profiling is sometimes referred to as ‘DNA fingerprinting’ or ‘DNA typing’.\textsuperscript{241} While investigating and deciding a case (whether a paternity dispute, an immigration issue, or identification of disaster victims or detection of a criminal), the DNA profiling mechanism has provided law enforcement agencies worldwide with a significant tool\textsuperscript{242} for ‘identifying individuals by detecting differences in cell structure’ as well as a means to arrive at appropriate judgments.\textsuperscript{243}

\begin{thebibliography}{99}
\bibitem{236} ‘Such privatisation and patenting of techniques has been widely criticised in the literature for a number of reasons including the consequent restrictions on information sharing and the vested interests of such company scientists in their court presentation and interpretation of profiling data.’: Easteal and Easteal, above n 215, 3.
\bibitem{237} Ibid.
\bibitem{238} The concept has been discussed in details in section 2.1.3.3 (ii) of this Chapter.
\bibitem{239} For further details see section 2.1.3.3(b) of this Chapter.
\bibitem{241} Norah Rudin and Keith Inman, \textit{An Introduction to Forensic DNA Analysis} (CRC Press, 2nd ed, 2002) 217.
\bibitem{242} Elazar Zadok, Gali Ben-or and Gabriela Fisman, 'Forensic Utilization of Voluntarily Collected DNA Samples: Law Enforcement Versus Human Rights' in Richard Hindmarsh and Barbara
\end{thebibliography}
The process of DNA profiling involves following important steps:

- **Sample Collection**: Collection of samples from the crime scene (unknown samples) or from victims and or suspects (known sample);\(^\text{244}\)

- **Analysis**: First, extraction, purification and quantification of DNA from all obtained samples are conducted; then copying or amplification of short tandems or segments of DNA is undertaken; the fragments are then visually examined under high powered microscopes; and finally the results are then analysed and transformed into a series of alpha-numeric code.\(^\text{245}\)

- **Comparison**: A comparison is made of the profiles obtained to existing samples to determine if there is any match (indicating the identity of the source is possible) or an exclusion (such identity is unlikely).\(^\text{246}\)

- **Matching**: When a match is found between the two DNA profiles, the likelihood of the match is estimated through statistical probability analysis. Such analysis is conducted in order to determine what proportion of persons in the same population as the suspect’s have the same DNA patterns.\(^\text{247}\)

In order to obtain DNA profiles, at present STR regions (which are sections or areas of non-coding DNA in the human genome) are compared around the world using PCR techniques. The following illustration exemplifies what are STRs and how STR sequences are repeated, such that if a section of DNA is stretched the following base sequence can be found:

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\(^\text{244}\) International Criminal Police Organization (INTERPOL), ‘INTERPOL Handbook on DNA Data Exchange and Practice: Recommendations from the Interpol DNA Monitoring Expert Group’ (1st Ed, June 2001) 40; see generally Goodwin, Linacre and Hadi, above n 207, 17–9.

\(^\text{245}\) Schumacher II, above n 243. See also INTERPOL, ‘Recommendations from the Interpol DNA Monitoring Expert Group’; above n 244; Goodwin, Linacre and Hadi, above n 207, 27–36.

\(^\text{246}\) Schumacher II, above n 243; INTERPOL, ‘Recommendations from the Interpol DNA Monitoring Expert Group’, above n 244.

\(^\text{247}\) Schumacher II, above n 243; see also Goodwin, Linacre and Hadi, above n 207, 83.
The above base sequence shows that at the beginning it appears random, but subsequently towards the middle sequence ‘CATG’ has repeated. Finally near the end the sequence becomes random again. The repetitive section of this sequence is referring to as an STR. In a given STR, individuals inherit different numbers of the repeated sequence from each of their parents. That means an individual may have inherited 11 repeats of the CATG sequence, on a chromosome from the mother, and 3 repeats of such sequence from the father. Thus, ‘the different numbers of repeats within an STR results in DNA of different lengths. Statistically, no two people (except identical twins) are likely to have the same numbers of repeats in all of these STRs.’ Electrophoresis is used to reveal how many repeats the person has.

Therefore it can be argued that each and every individual has a unique DNA profile or DNA fingerprint. Jeremy Gans and Gregor Urbas have defined DNA profiling as:

> ...a small set of features of non-coding DNA. ... [these] can be represented as an ordered series of numbers. … The features comprised in a DNA profile must be sufficiently variable throughout the population to have an acceptable statistical likelihood that the profile is unique in that population, but also sufficiently regular to be amenable to cheap and efficient mass analysis.

DNA profiling is a process by which the DNA presents in a biological sample (such as blood, saliva, semen, bone, hair and so on) from a human body is collected and analysed. The human body concerned could be that of a victim, a suspect or an accused person. It is a high-quality identification technique which compares two DNA samples and determines whether they are derived from the same body. Matching both the DNA samples indicates that they are from the same person (except in the case of identical twins). That analytical process generates digital

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248 Biotechnology Online, above n 83. Note: the initial pattern to be repeated is continuously underlined and the length of the repeat section is intermittently underlined. Together they form the STR.
249 Ibid.
250 Ibid.
251 Gans and Urbas, above n 128.
252 Ibid.
output which is similar to bar codes found on supermarket products\textsuperscript{253} or ‘read’ by grocery store scanners. This has become the standard forensic DNA analysis system throughout the world.

2.1.3.3 Technological Basis of DNA Profiling

It is evident that each human cell (except reproductive cells) contains approximately 3 billion-base pairs (bp) of DNA\textsuperscript{254}. These comprise genes whose bp range from several hundred to a ‘couple fo million’ bp. Less than five per cent of human DNA, comprising 30 000 to 40 000 genes\textsuperscript{255}, is responsible for particular characteristics. The rest (that is more than 95 per cent of DNA) is essentially non-functional and has been called ‘non-coding’, ‘non-genic’ or ‘junk’ DNA\textsuperscript{256}. Non-coding DNA was long thought not to have any role in developing biological differences and while it may not include information about human physical, psychological characteristics, or disease\textsuperscript{257}. However, it just may be that the function of this material has not yet been correctly and reliably identified\textsuperscript{258} and its effects may be subtle in regard to disposition to diseases and other matters\textsuperscript{259}. About 99.9 per cent DNA is identical for all human beings and only 0.1 per cent DNA is different. This 0.1 per cent DNA exists in the non-coding regions. It has been found that certain DNA sequences are repeated again and again in these regions. And the numbers of repetitions are different for different individuals. This kind of changes is called ‘polymorphism’ and areas are known as ‘polymorphic loci’ which exhibit detectable variations (called alleles’). In human DNA there are two types of polymorphic sequences\textsuperscript{260}, ‘variations in the sequence of DNA bases; and length variation arising from differences in the number of DNA bases between two defined end points’\textsuperscript{261}.

\begin{thebibliography}{99}
\bibitem{254} Goodwin, Linaac and Hadi, above n 207, 7.
\bibitem{256} Ibid. See also Trevor John Clark Beebee and Graham Rowe, \textit{An introduction to Molecular Ecology} (Oxford University Press, 2nd ed, 2008) 60.
\bibitem{257} INTERPOL, ‘Recommendations from the Interpol DNA Monitoring Expert Group’, above n 244.
\bibitem{260} Goodwin, Linaac and Hadi, above n 207, 12.
\end{thebibliography}
(a) Variable Number of Tandem Repeats (VNTRs)

The *Variable Number of Tandem Repeats* (VNTRs) are made up of repeated DNA sequences and located at different chromosomal sites.\(^\text{262}\) These are also known as ‘minisatellite’ sequences.\(^\text{263}\) The pioneer of the use of restriction enzymes in the DNA analysis, Alec Jeffreys, detected that the existence of variations in the length of certain DNA sequences. According to his findings these minisatellite sequences or tandemly repeated DNA sequences are hyper (that is, highly) variable between different individuals.\(^\text{264}\) In VNTRs, the core repeat sequence ranges in size from 6 to 100 base pair (bp).\(^\text{265}\) Such ‘core repeats are represented in some alleles thousands of times and the variation in repeat number creates alleles that range in size from 500bp to over 30kb’.\(^\text{266}\) This is the length variation referred to earlier. The VNTRs or ‘minisatellites are visualised by digesting the DNA with restriction enzymes to cut it into fragments of differing lengths that range between 1 and 20 kb in size’.\(^\text{267}\) VNTRs were the first polymorphisms\(^\text{268}\) used in DNA fingerprinting through the Restriction Fragment Length Polymorphism (RFLP) technique and were successfully used in resolving some identify related forensic cases.\(^\text{269}\)

(b) Short Tandem Repeats (STRs)

The other polymorphic sequence of human DNA is the ‘microsatellite sequence’\(^\text{270}\) or ‘*Short Tandem Repeats*’ (STRs). The core repeats in STRs are normally shorter than VNTRs, such that the loci of STRs consist of simple tandemly repeated sequences of 1–6 bp in length.\(^\text{271}\) They appear to be abundant throughout the human

\(^\text{262}\) Cummings, above n 240.

\(^\text{263}\) Semikhodskii, above n 84, 13.


\(^\text{266}\) Goodwin, Linacre and Hadi, above n 207, 12.

\(^\text{267}\) Gill and Buckleton, above n 22.

\(^\text{268}\) Goodwin, Linacre and Hadi, above n 207, 12.


\(^\text{270}\) Semikhodskii, above n 84, 15.

\(^\text{271}\) P Gill et al, 'Report of the European DNA Profiling Group (EDNAP) —Towards Standardisation of Short Tandem Repeat (STR) Loci' (1994) 65 *Forensic Science International* 51, 52. See also C P
genome and occur, on average, every 6–10 kb\(^{272}\) and are highly polymorphic.\(^{273}\) In human DNA there are several hundred (approximately) of these STRs or microsatellite sequences, ‘[b]ut 10–15 are sufficient to give exceedingly high levels of discrimination between individuals’.\(^{274}\) For instance, in the case of National DNA Database of the UK, 10 different STRs are analysed;\(^{275}\) and in the case of the Combined DNA Index System (CODIS) of the US, 13 loci are analysed in order to get a person’s profile.\(^{276}\) STRs have become the standard method and are ‘currently most commonly analysed genetic polymorphism in forensic genetics’ and have been successfully used in casework since the mid-1990s.\(^{277}\) Because STRs are smaller in size (< 300 bp)\(^{278}\) and length than VNTRs, they are easily and efficiently amplified and more accurately compared as opposed to VNTRs. STR testing also has other advantages over VNTR testing — in STR testing less DNA is required and the analysis is completed far more quickly even with degraded DNA samples and it is also highly discriminatory.\(^{279}\)

These samples (VNTRs and STRs) are used for the following two most used techniques for DNA profiling:

(i) Restriction Fragment Length Polymorphism (RFLP);
(ii) Polymerase Chain Reaction (PCR);

(i) Restriction Fragment Length Polymorphism (RFLP)
The Restriction Fragment Length Polymorphism (RFLP) is a technique was used for the first time in the world in the 1980s by the British biologists, Professor Alec

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\(^{273}\) Gill, Report of the European DNA Profiling Group (EDNAP)’, above n 271. See also Linacre and Graham, above n 264, 347.


\(^{276}\) Cummings, above n 240, 347.

\(^{277}\) Goodwin, Linacre and Hadi, above n 207, 12–13.

\(^{278}\) Gill, Report of the European DNA Profiling Group (EDNAP), above n 271.

\(^{279}\) Goodwin, Linacre and Hadi, above n 207, 13; see also Foreman, above n 274.
Jeffreys for DNA fingerprinting. RFLP analysis can be subdivided into two stages: the Multi-locus Probe (MLP) and the Single Locus Probe (SLP). At first the probe used was an MLP, which Jeffreys also used while inventing DNA fingerprinting in 1984. Two years later, the SLP was introduced in the US and then used in the UK from 1989 until the mid-1990s. They are almost the same; the only difference is that in SLP, VNTRs analysis is conducted using a single locus probe rather than multi-locus probe. The whole RFLP analysis process comprises the following steps:

- First, the collection of cellular samples (for example, skin, blood, saliva, bone, teeth, semen or hair of the human body).
- Next, long DNA samples are extracted from the samples and with the application of ‘restriction enzymes’ they are cut into specific fragments or short sequence (4–6 bases). In order to produce diverse groupings of fragment lengths, the DNA of different people is generally cut at different places, producing approximately 1 to 10 million fragments. ‘Gel electrophoresis’ is then used to sort the huge number of DNA fragments according to their length so that they could be analysed efficiently. This laboratory technique is used to separate the fragments into bands. In this technique, the molecules are placed on a slab of gel and then electric current is applied. DNA is a negatively charged molecule and the electric current moves it through the matrix of gel. When the current is applied, the molecules run at different rates. The smaller the fragment, the faster it moves through the gel, and when the current is stopped they are found in separate bands.

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280 INTERPOL, ‘Recommendations from the Interpol DNA Monitoring Expert Group’, above n 244.
282 See generally Fisher, Tilstone and Woytowicz, above n 281, 270.
284 Gill and Buckleton, above n 22, 6; see also Lynch, above n 261, 29; Szibor and Wittig, above n 283; Foreman, above n 274, 474; Gill and Buckleton, above n 22, 6–7.
285 Fisher, Tilstone and Woytowicz, above n 281, 270.
286 Schumacher II, above n 243, 1640. See also Burk and Hess, above n 124, 4.
287 Schumacher II, above n 243, 1640. See also Burk and Hess, above n 124, 5; Molecular Biology Cyberlab, Experiment 2: Gel Electrophoresis of DNA (2 October 2009) <http://www.life.illinois.edu/molbio/geldigest/electro.html>. 

bands according to their respective sizes. DNA fragments are thus prepared for next step of sequencing using a process called ‘probing’.

- Because a large number of fragments (1–10 million) are produced from human DNA, a further step is required so that a specific small region of DNA can be examined. In this process, DNA fragments are first denatured in the gel so that two strands of molecules are separated. The fragments are then transferred from the gel to a nylon membrane in a process called ‘Southern blotting’ or ‘southern transfer’. The transfer of the single-stranded fragments transfer from the gel to the nylon membrane produces a replica of what was originally in electrophoresis gel. At this stage the membrane is allowed to react in solution containing a probe labelled either radioactively or chemically, and the pattern of DNA is detected by exposing the membrane to x-ray film. Adding radioactive or chemical probes to the nylon membrane produces a pattern called the ‘DNA fingerprint’. The result is a pattern of DNA bands that looks like bar codes found on supermarket products. The pattern of fragments is unique for each individual.

Finally it can be said that the process of DNA fingerprinting involves extracting and cutting the DNA into small pieces of fragments of varying lengths. These are further analysed to reveal patterns in their occurrence (composition, location, length).

This technique requires a good amount of non-degraded DNA, which sometimes is very difficult to obtain from a crime scene. Moreover, the RFLP technique takes a
long time to process for results to be obtained for comparison testing. Because of its limitations and concurrent improvements in the DNA profiling method, most laboratories do not use the RFLP method, rather they currently prefer to use the Polymerase Chain Reaction (PCR) in DNA profiling.

(ii) Polymerase Chain Reaction (PCR)

As mentioned earlier, once DNA is extracted from human cells, it begins to rapidly degrade. This begins to occur as soon as it is no longer within the living organism. Another problem is that it is very often impossible to get sufficient DNA from the crime scene to supply a sample adequate to for use in DNA profiling. Both problems are solved by the PCR technique. An American biochemist and Nobel Prize laureate, Kary Mullis, discovered the PCR technique. Kary Mullis produced a chain reaction which replicated the original DNA. Newton and Graham has defined the term PCR as:

an in vitro technique which allows the amplification of a specific Deoxyribonucleic acid (DNA) region that lies between two regions of known DNA sequence.

McPherson and Moller describe it as a ‘DNA photocopier’. The PCR technique ‘is a simple and elegant procedure’. The PCR process involves the following three steps:

- First, the extraction of DNA after collecting the DNA from a biological sample.
- Secondly, amplification in the thermal cycler. This means that the DNA is denatured at a temperature of approximately 95° C for 30 seconds and 97° C for 15 seconds. Amplifications are normally carried out for 28 to 32 cycles.

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296 Fisher, Tilstone and Woytowicz, above n 281, 270.
297 INTERPOL, ‘Recommendations from the Interpol DNA Monitoring Expert Group’, above n 244. See also ibid 271.
301 McPherson and Moller, above n 298.
302 Kobilinsky, Liotti and Sweat-Oeser, above n 24, 70.
303 Fisher, Tilstone and Woytowicz, above n 281, 274.
After amplification, the two strings of the double helix become separated. First, a (10–15) STR sequence copy is made from this DNA by applying the PCR method where differences or polymorphisms exist. Then this PCR product is separated using the process of ‘electrophoresis’. In order to copy the STR sequence of a particular segment of DNA, one pair of small primers is required which copied that STR sequence from both sides and ‘fluorescent dye’ is attached inside one of those primer molecules. As a result, a laser beam inside the Genetic Analyser converts this fluorescent signal into a peak. Two computer software programs, ‘Gene Scan’ and ‘Genotyper’, which are attached to the Genetic Analyser gradually analyse the collected data and produce data in a digital format.

PCR is a molecular biological technique through which a particular DNA sequence can be amplified or copied from a small amount of DNA. This technique is ‘fast, reliable and extremely sensitive’ and can compare and analyse the short length of STRs. Moreover with this process it has become possible to analyse a small amount of DNA and even severely degraded DNA samples. The discovery of the PCR has contributed enormously to modern forensic science particularly forensic genetics, as it allows unrestricted amplification from very small and old sources (for instance, from samples collected from dried bone or skin). As a result, PCR has proven (and continues to be) very useful in criminal case investigation. After the discovery of the PCR techniques and its application to STRs, DNA profiling has taken the place of DNA fingerprinting and it has become widely popular. Currently, most forensic scientists examine 13 STRs loci. If the patterns match at every locus, then they might have come from the same person, and if they do no match at every

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305 Schumacher II, above n 243, 1642.
306 McPherson and Moller, above n 298, 90.
308 Martin, Schmitter and Schneider, above n 210, 227. See also Burk and Hess, above n, 124, 6; Nathan Van Camp and Kris Dierickx, 'National Forensic DNA Databases: Socio-Ethical Challenges and Current Practices in the EU' (European Ethical-Legal Papers No 9, GeneBanC, 2007) 6.
309 Goodwin, Linacre and Hadi, above n 207, 39.
310 Hocking, above n 83.
locus, it means they must have come from different sources, or the result is inconclusive.311

Apart from the RFLP and PCR, in some cases ‘mitochondrial DNA (mtDNA)’ and ‘Y chromosome STR’ process are used for identification purposes.

(iii) Mitochondrial DNA (mtDNA)
Mitochondrial DNA (mtDNA) testing is another important method of DNA profiling. The mtDNA is found outside the nucleus of cells and the mtDNA fragment is considerably smaller than nuclear DNA (nDNA).312 It is inherited maternally.313 There are only one or two copies of a nDNA in a human cell, but ‘in most cell types there are several thousand mitochondria, each containing 10–20 copies of a circular DNA molecule’.314 The main advantage of mtDNA sequence analysis is that mtDNA is available in degraded samples, such as, hair and bone, and dental material that has proved completely unsuited to other techniques.315 MtDNA ‘is extremely valuable in such testing, as it has high copy number and has no recombinational events’.316 However, there are some limitations, such as a person inherits mtDNA only from their mother, rather than from both of the parents. MtDNA profiling is also particularly susceptible to contamination and extreme care must be taken during processing.317 Moreover, it is the most time — as well as cost — consuming as well as the most rigorous of all DNA profiling techniques.318

(iv) Y Chromosomes STR Analysis
Kayser has noted that ‘[m]icrosatellites from the nonrecombining portion of the human Y chromosome have an important role in forensic genetics’.319 A man’s Y

314 Szibor and Wittig, above n 283.
315 Schumacher II, above n 243, 1644; see also Giannelli, above n 313.
316 Schumacher II, above n 243.
317 Giannelli, above n 313, 55.
318 INTERPOL, ‘Recommendations from the Interpol DNA Monitoring Expert Group’, above n 244, 42.
chromosome is inherited through the male line of a family\textsuperscript{320} and represents a unique record of his paternal inheritance. STR analysis on the Y chromosome is another useful method for identification and it has proved to be very useful for identification purposes, such as it is very significant when the paternity of a male offspring is in question.\textsuperscript{321} It is also useful in regard to sexual crime cases\textsuperscript{322} where samples may contain mixed male and female cells. Y chromosome STR analysis allows the resolution of a mixed DNA sample from a male and female. Roewer et al have observed that:

Y-chromosomal microsatellites are used in two ways: (1) to distinguish lineages (the number of markers and their variability will determine the degree of discrimination) and (2) to provide information about lineage relationships (the number of markers and the extent to which their properties are understood will influence the reliability of the inferences). Standard forensic databases use either 9 or 11 Y-chromosomal microsatellites.\textsuperscript{323}

In terms of useful STR markers, ‘there are a total of 219 useful STR markers available on Y chromosome.’\textsuperscript{324}

All of these technologies form the basis for DNA profiling. Generally, the developed countries have more advanced technology and are well equipped with experts. On the other hand, this is one of the biggest challenges for the developing countries and there is a lack of training for the technicians before commencement of using any new technology. The proper use of these technologies, and the experience of technicians are crucial in this arena, otherwise contaminated or erroneous results might be the outcome. At the same time, the technological basis of DNA profiling and databasing is growing very rapidly. Different techniques are useful for different situations. In order to get reliable results and detect criminals, scientists are still trying to develop some more accurate techniques for DNA profiling. Until now, the RFLP and the PCR have been the two most widely used technologies for DNA profiling. Technicians found the PCR method to be the more reliable and easy method

\begin{thebibliography}{99}
\bibitem{321} Ibid. See also Kayser, above n 319.
\bibitem{322} Ibid.
\bibitem{324} Varsha, above n 209, 185. See also Kayser, above n 319, 1187–8.
\end{thebibliography}
compared to RFLP. While using the PCR techniques, some countries use 13 STR loci and some others use 6 or 10 STR loci depending on their technological advancement and capacity. In some cases mitochondrial DNA (mtDNA) and Y chromosome STR analysis are also useful, depending on the circumstances and requirements of the case. Accurate and well defined technology is vital for this newly emerging area for delivering justice.

2.1.3.4 Sources and Functions of DNA Profiling

There are lots of potential sources of DNA samples which are very useful for DNA profiling purposes. Two main sources of DNA samples are: (i) samples collected directly from the human body (the suspects, victims or accused); and (ii) samples that have been dropped at the time of commission of the crime.\(^{325}\) Again, people sometime leave behind biological samples as a part of their daily life activities, such as when dropping chewing gum in the rubbish bin. The DNA or cellular samples can be collected by applying various forensic procedures. It can be collected from the victim’s body (for example, semen through vaginal swab in rape cases where the rapists ejaculate the fluid inside the victim’s body), or from their clothes (skin cells). Furthermore, sometimes DNA samples (blood stain, fallen hair with its root and saliva from a discarded cigarette butt or chewing gum) can also be collected from the crime scenes.\(^{326}\) It is also possible to collect a biological sample from a suspect, for example a buccal swab.\(^{327}\) Finally, all the biological samples can be collected from the suspect, depending on the nature of the case and necessity, either voluntarily or involuntarily (in the latter instance force may be used by the law enforcement officers).\(^{328}\)

DNA profiling of the samples collected is undertaken by the forensic scientists in the laboratory before a comparison analysis of the results of these samples with the results of other similar tests on other materials. The DNA profiles and the profiles derived from crime scene samples are compared or matched in a number of instances:

\(^{325}\) Gans and Urbas, above n 128, 2.
\(^{326}\) Ibid.
\(^{327}\) Ibid.
\(^{328}\) Ibid.
• Crime scene samples of DNA other than the victim’s (for example, skin cells or hair found on the body or victim’s possessions) are compared with a known person’s profile where there is a reasonable belief and also other circumstantial evidence of that person being the offender in order to establish prior contact;
• Crime scene samples of the victim’s DNA are compared with material found on a suspect or their possessions to establish prior contact;
• DNA comparison is also done of a known person (for example, a relative of a particular missing, unidentified or deceased person) with that of an unknown person in order to identify DNA from a missing person or unidentified person or dead body;
• Samples from two separate crime scenes are compared to infer the possible involvement of someone in both of the crimes.\(^{329}\)

A positive DNA profile matching helps to identify and confirm the real offender, and at the same time it nullifies the suspicion directed at innocent people. When it is difficult particularly to detect the actual perpetrator, then mass screening or screening of a group of people from a particular locality or community is done by the investigators. A positive match with one person from such a screening would directs strong suspicion on that person, while a negative match for all would eliminate the entire group from suspicion.

2.1.4 SIGNIFICANCE OF FORENSIC USE OF DNA PROFILING

The advantages offered by DNA testing over other techniques are manifold. As pointed out by Richards, ‘it is much more likely that tissue containing DNA can be found. And using computer technology, it is also simpler to store and search a DNA data base than a photograph or finger print collection’.\(^{330}\) At present the technology is used all over the world both in civil and criminal proceedings and for other matters. The DNA profiling technique has lots of potentialities, but currently it has contributed an enormously in the criminal case investigation process, parentage testing, the identification of missing persons or of an unknown dead body, be that

\(^{329}\) Ibid.

\(^{330}\) Martin Richards, 'How Distinctive is Genetic Information?' (2001) 32(4) Studies in History and Philosophy of Biological and Biomedical Sciences 674, 674.
person a victim of a disaster or murder, and also some other kinds of disputes where identity is a question. Some notable uses are discussed below:

2.1.4.1 Use in Criminal Proceedings

(a) Using DNA to Identify Criminals and Suspects
Traditionally, photographs or facial appearance and fingerprints have proved to be effective in the criminal investigative process. However, there are some limitations to using these tools, such as fingerprints are not always left at all the crime scene or eye witness is not always available or reliable for every incident. DNA profiling or fingerprinting has, in these and other circumstances, proved to be a very useful mechanism in detecting criminals around the world and it is now widely used in the criminal investigative process. In this process samples from the suspects are used to match with samples collected from a crime scene or victim. In addition, DNA testing is also useful to acquit a convicted person, where the person is shown to have been wrongfully convicted on the based on false or limited evidence without recourse to the benefits of DNA profiling.

(b) Identity of Disaster Victims
DNA information is also useful to identify deceased persons who are either homicide victims or victims of a terrorist attack or natural disaster. In this situation where the deceased person is not easily recognisable, due to the cause of death or delay in locating the body, DNA profiling is used to identify those deceased victims. This tool is also useful in locating missing persons. In this context Frederick R Bieber in the Book on ‘DNA and the Criminal Justice System’ has outlined that:

[The DNA profiling mechanism] ... can be utilized in humanitarian identification of bodies from natural disasters or accidents (eg, identification of plane crash and other victims from September 11, 2001, attacks on the United States), identification of war crime victims (eg, Kosovo and Bosnia), reunification of family members separated by wars, natural disaster, or political oppression (eg, in Argentina), and identification of recovered remains from “unknown soldiers”.

331 Ibid.
DNA analysis has also brought together individuals and their separated family members in the aftermath of natural or manmade disasters (for example, separated infants claimed by more than one family after a flood) as well as identifying deceased persons who are the victims of such disasters or of massacres.

2.1.4.2 Use in Civil Proceedings

(a) Parentage and Legitimacy

DNA identification has also proved to be ‘a … technique for paternity and kinship determinations’. DNA profiling is used for the purposes of paternity testing, in other words to resolve the paternity discrepancy (PD). Advances in the genetic identification mechanisms and their extensive public access have provided scope for the individuals and courts to determine the PD issues. Genetic information is therefore very important in instances where parentage or other familial relationships are to be ascertained. Once there is an uncertainty regarding the legitimacy of a family relationship, especially in case of paternity, the accurate relationship can be identified through their DNA information. Some other greatest benefits of parentage testing through DNA information include settlement of inheritance disputes, maintenance issues and so forth.

(b) Immigration Cases

Immigration departments are also interested in human genetic information due to its significant role in a number of issues. For instance, DNA information is useful in immigration screening process in order to assess the health status of applicants, as a proof of family relationships, and also detecting false identities. Therefore, it contributes in reducing fraudulent claims. For instance, the Minister for Immigration

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334 Mark A Bellis highlighted that:

Typically, PD is associated with a woman having a sexual relationship (usually covertly) outside of her marriage or long term partnership. Here PD occurs when a child is believed to have been fathered by the husband (or partner) but is actually the progeny of another man.


335 It is so sensitive that, where required, it can distinguish between two brothers, even when they are non-identical twins, see Francisc Mixich, Mihai Ioana and Vlad A Mixich, 'Paternity Analysis in Special Fatherless Cases without Direct Testing of Alleged Father ' (2004) 146(Supplement 1and 2) Forensic Science International S159, S160.

336 See, eg, Australian Law Reform Commission, Protection of Human Genetic Information, above n 175, 362 [12.11].
and Multicultural and Indigenous Affairs has indicated that ‘in future, genetic testing might also be used ... to identify asylum seekers; to ensure that they do not already have protection elsewhere; and to ensure that they have not previously been refused refugee status by another country’.  

2.1.5 ASSESSMENT OF RELIABILITY AND EFFECTIVENESS OF DNA TECHNOLOGY

DNA profiling technology has been proved to be a powerful tool in forensic science. However, the scientific validity of its application by laboratories and or its reliability has been questioned in many cases. The process of ascertaining the guilt or innocence of any person based on presumptions or probabilities of DNA data could be dangerous. In criminal cases, there are concerns over the use of DNA evidence. The reliability of DNA evidence has been challenged in many cases, for instance, in the case of the People v Castro ‘some doubt [had been] cast upon its scientific acceptability’. After discussing the scientific merit of the case, the four scientists (defendants) who were involved in the hearing, concluded that ‘serious doubts [existed as to] the reliability of the DNA evidence’. They drew such conclusion ‘based on the test procedures used and the interpretation of the results’.

The question of ‘efficiency associated with new technologies, the concept of infallible scientific truth and the neutrality of DNA science’ are therefore, now called into question in many cases. Some problems are purely technical in nature such as degradation, deterioration of the sample, poor sample condition, contamination of samples and laboratory error which could give rise to false results. Many such problems could also arise because of the use of DNA analysis done by laboratories with little experience. Problems may also arise because of biased interpretation, fraud and the intentional or unintentional human errors. The

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338 Easteal and Easteal, above n 215, 5.
followings are some common areas where scientific validity or reliability is subject to some challenges:

2.1.5.1 DNA Profiling is Not Conclusive Evidence

Although it is claimed that DNA patterns are ‘unique’, at the same time scientists acknowledged that there was chance that ‘one individual's DNA pattern may have similarities with another's DNA pattern’\(^{342}\), and in some cases DNA pattern is identical, for instance, in case of identical twins. The probabilities of one person having an identical DNA pattern with another are remote. It means the chance of matching DNA profiles of two unrelated individuals is on average less than one in a billion.\(^{343}\) Nevertheless, the reality is that the chance is there. For this scientific feature of DNA data, DNA profiling is not conclusive evidence and such evidence is needed to be corroborated by other evidences.

2.1.5.2 DNA Evidence Subject to Human Errors

In the case of DNA profiling, like many other technologies, there is always room for mistakes or human errors. This is because this technology relies on people to carry out actions or make judgments. Mistakes or human errors may happen in a number of occasions, such as, mishandling of this technology, such as, DNA samples collected from scene of crime can be misinterpreted or misplaced. They can also be inadvertently mixed with other samples. In this regard, Scutt has argued that:

> The reality has to be acknowledged that sometimes, sadly, 'over enthusiasm' can lead to forensic evidence being manufactured. 'Over enthusiasm' can also lead to unintentional error. Australia has too many instances of forensic evidence being misused and abused (the Chamberlain case, the Perry case, the Splatt case...) for enthusiasm for new tests to be allowed to carry the day.\(^{344}\)

The consequence such errors is that either an innocent person could be wrongly accused or alternatively an offender might escape punishment. The possibility of errors therefore undermines the reliability of DNA evidence, although the extent of such errors is not determined yet and still under dispute. This error could lead to miscarriage of justice.

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\(^{344}\) Scott, above n 342, 12.
However, the opponent view is that if there is any defect in the sample or in the testing procedures, it will result in a complete failure to produce any result. DNA fingerprinting was approved by the Florida Court of Appeals in the case *State v Andrews*. In this case the Court argued against the possibility of error and concluded:

The testimony here was that if there was something wrong with the process, it would ordinarily lead to no result being obtained rather than an erroneous result. Further control samples are employed throughout the process which permits errors, if any, to be discovered. These factors are further indicia of reliability.345

2.1.5.3 Contamination of Samples

In a crime scene there may have DNA sample from persons other than the real offender. DNA samples of one person can therefore, be contaminated if they come into contact with DNA from another person. This can happen if a sample is mishandled by the police while collecting the evidence or the laboratory staff carrying out the analysis.346 Therefore, errors and mishandling demonstrate fallibility and limitations of DNA technology in quest of justice.

Simon J Walsh rightly argued that ‘[d]espite some disagreement regarding substantiveness of this technology, general consensus seems to have been reached that DNA evidence has an important role in the pursuit of criminal justice’.347 It is important to note that ‘the Castro case did not question the fundamental scientific value and acceptance of DNA profiling’.348 In fact, the forensic use of DNA test has finally got the approval of the Congressional Office of Technological Assessment (OTA). In its report this office concluded that DNA profiling is ‘reliable and valid when properly performed and analysed by skilled personnel’.349

Finally it is to be argued that the scientific reliability and accuracy of DNA profiling is well accepted by the forensic scientists. Consequently, DNA profiling has gained popularity as an identification tool in law enforcement. However, some doubts have been raised against the technology, which must be resolved in order to ensure its wider applications. The Castro case has identified the importance of standardised

346 Staley, above n 275, 19.
347 Walsh, above n 341, 51.
348 Eastal and Eastal, above n 215, 5.
procedure for DNA evidence.\textsuperscript{350} There has always been a good deal of faith in DNA profiling as evidence.\textsuperscript{351} DNA profiling is a rapidly changing and complex technology. If such technology is used properly and fairly, it could be a reliable and supportive technique.\textsuperscript{352} Therefore, some mechanism should be there to rigorously monitor DNA profiling process and to support independent research, which will protect and improve the reliability and accuracy of DNA technology.

2.1.6 FORENSIC DNA DATABASES: EXISTING SCENARIO IN THE INTERNATIONAL CONTEXT

A Forensic DNA database is a digital repository of DNA profiles generated from biological samples. DNA profiles are electronically stored in such repository for comparison with profiles generated from samples obtained either from the scene of a crime, or from the body of a suspect.\textsuperscript{353} One of the main objectives of such DNA database is to ‘link individuals to unsolved offences and unsolved offences to each other by means of DNA profiling’.\textsuperscript{354} Nowadays, it is also used for civil proceedings, such as parentage testing, identification of missing persons or an unknown dead body, disaster victims and so on. A forensic DNA database generally stores DNA profiles of unidentified crime scene stains, that of suspects, victims, convicted offenders and in some cases also of missing persons. Some databases store only DNA profiles, whereas some others stored both sample and profiles, for instance, the UK National DNA Database retains both DNA samples as well as DNA profiles. DNA samples are retained in order to resolve any test result disputes, or for retesting purposes,\textsuperscript{355} for in the event upgrading of the technology, and also for the purpose of quality control.\textsuperscript{356} Currently the potential of DNA profiling have stimulated law enforcement agencies around the world to establish forensic DNA databases as one of their key investigative strategies. During the past decade, the establishment and maintenance of forensic DNA databases has been a priority of many national and

\footnotesize{\textsuperscript{350} Rensker, above n 309, 318.\textsuperscript{351}Patsy Hughes, ‘DNA Fingerprinting’ (Research paper 96/44, Science and Environment Section, House of Commons Library, 1996) 21.\textsuperscript{352}Easteal and Easteal, above n 215, 2.\textsuperscript{353}Law Reform Commission, ‘Forensic Use of DNA’ (Law Reform Commission of Mauritius (LRC), Discussion Paper, April 2009) 2.\textsuperscript{354}Ibid.\textsuperscript{355}Rothstein and Meagher, above n 50.\textsuperscript{356}Staley, above n 275, 48.}
international law enforcement agencies. The technique gains immense popularity throughout the world.

A significant piece of research on the current establishment and uses of forensic DNA databases across a number of countries has been undertaken by INTERPOL. In order to obtain a global overview of the use of DNA profiling in criminal investigations, INTERPOL has conducted three surveys since 1999 among its 188 member countries. In 2002, the INTERPOL DNA Unit conducted another survey into the use of DNA analysis in criminal investigations among the 179 member countries. According to this report, 41 Member States (23 per cent) have an operative DNA database and a further 38 per cent of the member countries were expected to establish a DNA database in the next few years. INTERPOL DNA Unit began to conduct its third survey of its 188 members to the use of DNA information in support of criminal case investigation in June 2006. By the end of 2008, a total of 172 member countries had replied to this latest INTERPOL global DNA survey. INTERPOL has analysed these replies together with the results from previous surveys, and data obtained from other official sources such as INTERPOL’s DNA Monitoring Expert Group. According to the report, 120 countries use DNA profiling in their police investigations and 54 countries have a national DNA database. The survey also shows that ‘over 50% of the countries in all regions (except the African region) use DNA profiling in criminal investigations’. Region specific survey results are given below.

### 2.1.6.1 Analysis Results

In order to identify the differences between and among the countries and regions, and also to determine global trends, INTERPOL has divided its member states into five

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358 INTERPOL DNA Monitoring Expert Group, above n 66, 51.
359 INTERPOL DNA Unit, above n 66, 1–28.
361 Ibid 58.
363 INTERPOL DNA Monitoring Expert Group, above n 66, 52.
different regions: Europe, North Africa and the Middle East, America, Asia and the South Pacific, and Africa365.

Table 1: Global Overview: Countries using Forensic DNA Databases

<table>
<thead>
<tr>
<th>Global Distributions</th>
<th>European Region</th>
<th>North Africa and the Middle East Region</th>
<th>Americas Region</th>
<th>Asia and the South Pacific Region</th>
<th>African region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regions use DNA Profiling</td>
<td>46 countries (94%)</td>
<td>13 countries (76%)</td>
<td>27 countries (73%)</td>
<td>20 countries (57%)</td>
<td>14 countries (29%)</td>
</tr>
<tr>
<td>Regions have National DNA Database</td>
<td>31 countries (63%)</td>
<td>9 countries (53%)</td>
<td>5 countries (14%)</td>
<td>7 countries (20%)</td>
<td>2 countries (4%)</td>
</tr>
<tr>
<td>Regions DNA database Legislation</td>
<td>72%</td>
<td>No DNA database legislation</td>
<td>40%</td>
<td>43%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: INTERPOL Global DNA Profiling Survey Results and Analysis (2008)366

With regards to the use of DNA profiling, the INTERPOL survey reports pointed out that the European region has the highest percentage of countries (94 per cent), followed by 76 per cent of countries in North Africa and Middle East which is closely followed by the Americas (73 per cent) using DNA profiling. In Asia and the South Pacific region 57 per cent countries and in the African region 29 per cent countries are known to use profiling.367 A similar trend is found in terms of the number of countries which have national DNA databases; such that Europe again has the highest percentage of countries with national databases (63 per cent) while the

365 INTERPOL DNA Unit, above n 66; see also ICPO-INTERPOL, ‘INTERPOL Global DNA Profiling Survey Results and Analysis 2008’, above n 66.
367 Ibid 60.
second highest percentage belongs to the North Africa and Middle East region (53 per cent). While in this category the Americas region has smaller percentage (14 per cent) when compared to the Asia and South Pacific countries (20 per cent). Finally, the African region has the smallest percentage of countries with national DNA databases (4 per cent).\textsuperscript{368} With regards to the issue of the number of countries that have adopted specific DNA database legislation, 28 countries of a total of 54 (that is, based on countries that have replied) have DNA database specific legislations. Among them, 72 per cent countries from Europe have national DNA database legislation, whereas none of the countries in the North Africa and Middle East region has such legislation.\textsuperscript{369}

(a) European Region

From this survey’s results it is evident that the European region which consists of 49 member states has the greatest penetration rate of DNA profiling technology, as among these 49 countries, 46 countries (94 per cent) use DNA profiling techniques in their investigative process (see Table 1). From an analysis of this survey’s findings, it can be argued that Europe followed by the North Africa and then the Middle East and Americas regions are the highest level of participation in forensic DNA analysis (see table 1). Due to its advantages to the criminal justice system, the techniques of DNA analysis were acknowledged by the Council of Europe more than 15 years ago.\textsuperscript{370} Since that time member states have made rapid and marked progress in using DNA information in the determination of innocence or guilt.\textsuperscript{371} In its Resolutions of June 1997\textsuperscript{372} and June 2001\textsuperscript{373} on the Exchange of the Results of DNA Analysis, the EU council has urged for properly operated databases in member states. Up until 2008, 31 European countries have successfully introduced national

\textsuperscript{368} Ibid 61.
\textsuperscript{369} Ibid 66.
\textsuperscript{371} Mathias Vermeulen, above n, 370.
DNA databases,\(^{374}\) notably, Austria, Germany, the Netherlands and France in 1998, Finland and Belgium in 1999, and Denmark in 2000. Sweden has already a database of unknown crime samples. Switzerland and some Eastern European countries also took steps in this direction. It should be noted here that the UK National DNA Database (NDNAD) is six times larger than the second largest database (that of France) in this region and the database size is 2.3 times greater than that of the other European member countries.\(^{375}\) It is recognised as the first operating as well the largest European national DNA database for offender identification. Sources of samples for those databases are the DNA samples from suspected and convicted criminals, as well as the DNA stains collected from the crime scene of unsolved cases. Moreover, within the European region, research on the EU databases is conducted by a number of groups or institutes. The European DNA Profiling Group (EDNAP), the Standardisation of DNA Profiling in the European Union (STADNAP) group, and the European Network of Forensic Science Institutes (ENFSI) are some of the most significant organisations to consider issues of DNA profiling and databases in the EU.\(^{376}\) There is a standardisation of procedures for DNA testing and comparison with databases within Europe.\(^{377}\)

Currently substantial interest exits among the EU member states for establishing national DNA databases. However, there remain some variations or differences across the member states in forensic DNA database practices. Considerable cultural, political diversity and variations on the criminal justice approaches (which include common law and civil law disparities as well as differences among court systems) exist among them, which are based on historical developments and different natural heritages.\(^{378}\) Robin Williams and Paul Johnson in their report\(^{379}\) highlight that there are some differences in DNA databases adopted by EU member states in terms of technical capacity, national legislative mechanism or background for the use of DNA in criminal investigations. There are also some differences in ethical perspectives in

\(^{374}\) ICPO-INTERPOL, ‘INTERPOL Global DNA Profiling Survey Results and Analysis 2008’, above n 66, 35.
\(^{375}\) Ibid 42.
\(^{377}\) Martin, Schmitter and Schneider, above n 210, 228–9.
\(^{379}\) Ibid.
regards to the use of DNA databases, including in regard to privacy rights and the confidentiality of genetic information, the nature of consent in relation to criminal investigation, government interference or surveillance, and the proper form of database governance. Nevertheless most of the EU member states successfully utilise DNA database in support of their criminal investigations.

(b) Americas Region

The INTERPOL survey highlighted that the Americas region has also progressed dramatically, in parallel with the European region. For instance, the Americas region consists of 37 member countries. Among them, 35 countries (95 per cent) are included in this survey. According to the report, 27 countries (73 per cent) use DNA analysis in criminal case investigation and 5 countries (namely, the USA, Canada, Panama, Colombia and Jamaica) — which is 14 per cent of the total number of countries in the region — have a national DNA database.

Among these the USA has the largest national DNA database — the Combined DNA Index System (CODIS) — with at least 6,702,743 profiles by 2008. The DNA Identification Act of 1994 authorised the FBI to establish the national DNA database for law enforcement purposes. The CODIS conducts DNA analysis involving computer technology so that the laboratories at the local, state and national levels can share and compare DNA profiles with each other. The FBI uses a standard set of 13 specific STR loci in the CODIS. The NDIS contains DNA profiles from: convicted offenders; crime scene samples; arrested persons (subject to the permission of state laws); unidentified human remains and from the relatives of missing persons who have contributed profiles voluntarily. Moreover, ‘all 50 US states have currently enacted legislation to establish DNA databases and permitted state-to-state comparisons.’

380 Ibid.
382 Ibid 63.
(c) North Africa and Middle East Region
The North Africa and Middle East region consists of 17 INTERPOL member countries. Among these, 13 countries (76 per cent — a higher percentage than for the Americas region) are known to use DNA profiling and 9 countries (namely, Bahrain, Israel, Kuwait, Saudi Arabia, the United Arab Emirates, Iran, Jordan, Egypt, and Morocco) (53 per cent) have national DNA databases, which is less than Europe and America, but higher than other regions.

(d) Asia and South Pacific, African Region
The situation of Asia and the South Pacific, and the African regions, differs from the other regions as these mostly comprise developing and least developed countries compared to other regions. The most notable exception is Australia. Developing and least developed countries are recognised for their various common issues, such as lack of financial capacity, human resources, technological development. Nevertheless 20 countries from this region are known to use DNA analysis in their criminal investigation process and 7 countries have national DNA databases (see Table 1).

In this region, Australia is a developed country and, in 2001, the Australian federal government, in co-operation with the six states and two territory governments established the National Criminal Investigation DNA Database (NCIDD) system as part of the CrimTrac initiative. CrimTrac is an executive agency of the Commonwealth Government. The NCIDD is a national DNA database not solely for the Commonwealth of Australia. The information on the NCIDD overwhelmingly consists of profiles are placed on it by the States. The NCIDD became fully operational across all Australian jurisdictions in April 2009 and it is ‘an integral part of Australia’s resources for identifying suspects for a variety of crimes, including the

387 Ibid 49, 52.
most serious, and for serving other important social purposes such as identifying disaster victims and tracing missing persons’.  

2.1.6.2 Evaluation

The results from this survey clearly indicate that the use of DNA profiling and databases has increased in all regions. It should be noted that all European countries have replied to this survey, eliminating any uncertainty in their trends, whereas the opposite scenario applies in the Asia and South Pacific region. That means in this region the highest number of countries (31 per cent) did not reply to the INTERPOL surveys. It is further to be noted that compared to other regions, there are a considerable number of DNA databases in the European region. From this survey the author also identified that Africa has by far the highest number of countries (44 per cent) which do not use this forensic technique. It is also evident that worldwide 28 of 54 countries known to have a national database have implemented DNA database legislation. Although not all countries have DNA database specific legislation, rather in many countries DNA databases are in fact regulated by existing penal laws. In addition the author has not found any co-relation with regards to time between the existence of DNA database and the presence of it regulatory legislation. 

There is also a lack of coherence regarding the criteria for a suspect or criminal to be included in the database, the storage periods and the removal criteria among some of the countries that have DNA databases. Some countries include only the convicted offenders of serious crimes in the DNA databases, such as those convicted of sexual crimes, crimes against life, or include also robbery, theft or blackmail. In others, the criteria of entry depend on the corresponding number of years of imprisonment. Serious crimes with a strong possibility of leaving biological material and with eventual repetitive characteristics are some basic criteria which are usually considered in some jurisdictions for high priority inclusion of a DNA profile on the

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392 Ibid.  
393 Ibid 66.  
database. The experience of some other databases also indicates that some suspects are usually involved in minor offences before the commission of a serious crime. As a result minor offences are also important criteria in some jurisdictions. All these facts (such as serious crime, its repetitive patterns) support the importance of DNA databases not only for the criminal investigation but also for the prevention of crime. Not only are persons convicted and imprisoned for crimes committed, others may also be deterred by the increased likelihood of detection, thus preventing crime.

An INTERPOL survey report further suggested that among the 54 countries which have a national DNA database, only 21 are developing countries. This means only 40 per cent with national DNA database are developing countries. The number of databases is greater and the success rate is higher in developed countries in comparison to the developing world. For instance, most of the ‘top ten’ largest DNA databases (that is, the US, UK, France, Germany, Australia, Austria, Canada, South Africa and Switzerland) are from the developed countries. On the other hand a few DNA databases or laboratories have been established in developing countries, such as the Malaysian DNA database, the Indian database, and the National DNA profiling laboratory of Bangladesh.

Based on the analysis and evaluation of this survey, the research further identified that it is the general trend that mostly the developed countries have national DNA databases and that these are running sustainably. The developed countries have generally progressed and advanced well in terms of the creation and operation of

395 Corte-Real, above n 394, S144.
396 Belarus, Bulgaria, Botswana, China, Colombia, Croatia, Egypt, Iran, Jamaica, Jordan, Latvia, Lithuania, FYR Macedonia, Malaysia, Morocco, Panama, Poland, Romania, South Africa, Tunisia and Ukraine, this list has been identified by the INTERPOL DNA Monitoring Expert Group, above n 66, 54–5.

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their DNA databases, and in their regulation, as well as the adoption of technological developments as they occur, when compare to the experience of developing countries. The reason is simple: developed countries are financially stable and technologically sound. As a result developed countries can more easily afford to adopt such technology when compared to the developing and least developed countries. However, this is not always the case and there are some exceptions to this general trend. Apart from economic ability or financial consideration, the establishment and running of national DNA databases depend on a number of various other factors, such as the perceived necessity for such a database, the purpose and/or political will of a government, requirements for compliance with global standards, and/or pressure from several national (for example, NGOs, various lobbyist groups) and international actors (such as donor agencies). Some developed countries (for example, the Bahamas, Barbados) do not have a DNA database, where as some developing countries do (for example, China). For what purposes databases are created, and to what extent human rights and genetic privacy would be preserved, are questions of fact and depend on the country concerned.

2.1.7 CONCLUSION

This chapter has briefly outlined the scientific background of DNA and DNA profiling technology from a very general point of view. It also highlights the nature and significance of genetic information. The discussion also provides a brief history of the DNA profiling system, its various kinds of functions and utilities. The context and extent of the establishment and use of DNA databases were then also addressed. Finally it argued and concluded that in comparatively recent years there has been widespread forensic use of DNA information. Such utilisation, however, has some associated challenges, in particular human rights and privacy issues.

The next Chapter (that is, Chapter 3) will go on to examine human rights and privacy violation issues in the context of forensic use of DNA information. It will also look at or visualise the whole picture and give an overview of human rights, the right to privacy and genetic privacy, and their justification in the international arena from the

399 INTERPOL DNA Unit, above n 66, 26.
400 World Bank, How We Classify Countries—Country and Lending Groups, above n 397.
401 Ibid.
legislative point of view. Finally this chapter will highlight how individual rights can be balanced with state security measures or social interests.
CHAPTER 3

3.1 FORENSIC USE OF DNA INFORMATION V HUMAN RIGHTS AND PRIVACY

3.1.1 INTRODUCTION

The advances of science and technology have resulted in the increased use of human DNA information in the justice delivery system in almost all jurisdictions. The many benefits brought by knowledge of the human genome are undeniable. Among these, the forensic use of DNA (that is, in DNA profiling) has proved to be a mechanism with great potential to assist the law enforcement agencies in detecting real offenders and identifying innocents with some precision. As a method it is a rapid as well as a more precise and accurate means to facilitate safe convictions. This is because, apart from identical twins, every person’s DNA is unique. It can produce invariably accurate and individually specific information about a person and does not change throughout a lifetime. The unique nature of a DNA sample facilitates the detection of human identity. DNA profiling techniques (that is, DNA analysis results of collected samples) are used in this identification process.

There is no doubt that this new technology can be used as an effective tool in the detection of crime and the prosecution of criminals so as to accelerate the control of crime and contribute to a better society. At the same time there is an ongoing debate regarding misuse of DNA samples and information to violate genetic privacy and to discriminate against people. This is because DNA samples (such as blood, semen, bone and so on) are the prospective sources of one’s personal genetic information (such as, gender, race, health information, predisposition to diseases and so on) and can also reveal information relating to an individual’s identity. The DNA samples that are used for forensic purposes are, similarly, potential sources of highly sensitive

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404 For further details see section 2.1.2.2 of Chapter 2.
information about victims, suspects or criminals and their families. Utilisation of this sensitive information presents several ethical, social and legal challenges including but not limited to human rights and privacy violations. For instance, sometimes the law enforcement agencies and forensic science departments carry out DNA testing without obtaining suspects or victims’ informed consent. This can be treated as an infringement of genetic privacy.

The claim by advocates for DNA use for various purposes is that this technique is no more risky than the traditional fingerprint evidence. However, as privacy rights advocates point out, fingerprints provides only limited evidence related to a person’s identity, whereas someone’s DNA contains important health information both about himself and his family, including collateral relatives (such as cousins) as well as ancestors and descendants. Therefore using DNA information for forensic purposes poses a far greater risk for privacy than using other conventional evidence like fingerprints and photographs,\textsuperscript{406} as these (particularly fingerprints) convey information related solely to the identification of that individual with no implications for other persons. As a result, the issues related to human rights, and more specifically the right to genetic privacy, are some of the biggest challenges posed by this newly emerged technology of DNA profiling. Yet such privacy issues and other challenges with regards to forensic use of genetic information have not been taken seriously by many governments around the world. In addition some governments (for example, the UK) are retaining this sensitive data indefinitely, providing great power to the police. An additional complication is provided by the fact that ‘[a]lthough the techniques are widely understood by scientists and criminal investigators, the public in general does not have a deep understanding of the technology’.\textsuperscript{407} There is little public attention and debate in this arena. These factors have increased the vulnerability of genetic privacy. It is, therefore, argued that while using genetic information for forensic purposes, it is necessary to protect several ethical values such as privacy. In order to ensure a fair trial and the better delivery of justice, the necessity for new and frequently use of DNA tools and techniques cannot be


overlooked but at the same time, its proper use needs to be ensured so that human rights, and particularly the right to privacy, are not compromised.

At this stage it is significant to address some basic concepts, namely those of ‘human rights’, the ‘right to privacy’ and ‘genetic privacy.’ ‘Human rights’ has remained an important concern for the world community and for the past few decades ‘privacy’ has also been considered as one of the major issues in the contemporary context worldwide. The field of human genetics and use of DNA data for the administration of justice have added a new concern —‘genetic privacy’ — to these existing issues. The first part of the discussion will address these three ideas. The second part of this chapter provides details about the right to privacy and genetic privacy and its existing legislative justification in both the national and international context, and including in case decisions. Subsequently, section 3.1.4 compares the interface of the forensic use of DNA information and the right to privacy and genetic privacy, and then section 3.1.5 outlines the future of the forensic use of DNA profiling. Finally, this chapter concludes with a brief consideration of how these two mutually opposite but inter-dependent issues could draw on one channel so that they can contribute in the maintenance of social harmony and justice.

3.1.2 HUMAN RIGHTS, RIGHT TO PRIVACY AND GENETIC PRIVACY: AN OVERVIEW

3.1.2.1 Human Rights and Privacy: An Overview

‘Privacy’ is an important human right and has its roots in the system of moral values which places considerable emphasis on the protection of the rights as well as interests of individuals. It also presupposes such social norms as respect for individuals.408 There were obviously no such concepts as DNA or genetic privacy before recent scientific and technological advances. Technological development has provided means to gather and manipulate genetic information409 and a new concept of privacy has therefore has evolved. Bris and Knoppers recognised privacy as

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408 Laurie, Genetic Privacy, above n 205, 84.
409 Ibid 25.
‘complex concept, multifaceted, fluid and evolving’. In order to understand the issues relating to this concept, and to be able to discuss as well as analyse material supportive of the concept of genetic privacy, it is important to first explore the meaning of ‘privacy’, and then the scope of ‘genetic privacy’.

As the authors of the Nuffield Report observed:

> It is generally recognised that every one of us has a protected zone of privacy into which neither the state nor other persons should intrude without our permission. This can be seen as derived from a more basic right to autonomy, or as a precondition for the exercise of autonomy, or as an independent moral principle. ... [therefore] [t]he precise extent of this protected zone is difficult to define.

The term ‘privacy’ has several meanings and it has various aspects based on different contexts. Gavison argued that with regards to the status of the term, privacy could be a situation (state or condition of limited access to a person), a right, a claim, a form of control, a value ‘to determine what information about himself may be communicated to others’; and with regards to its characteristics, privacy could be related to information, autonomy, personal identity, and physical access. Different people, cultures and nations have separate viewpoints regarding what should be the scope of ‘right to privacy’, and what should constitute a ‘violation of right to privacy’. Generally speaking, ‘right to privacy’ means:

> [A] claimed right to choose with whom to associate, as in marriage or certain residential situations. It can refer to a right to avoid unwanted publicity, even if accurate. It can denote a right against unwanted physical intrusion into one’s body or one’s home, ... Finally, it can mean confidentiality — the right to insist that information, conveyed to one party for a particular purpose, not be retransmitted to another.

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411 Nuffield Council on Bioethics, ‘The Forensic Use of Bioinformation’, above n 54, 28 [3.6]–[3.7].
413 Ibid 2.
The scope of privacy also refers to the ability to make particular decisions without governmental intrusion, for instance, right to an abortion\textsuperscript{416}, the right of an individual to refuse food and medical treatments and so on. The Office of the New South Wales (NSW) Privacy Commissioner of Australia has defined the term ‘right to privacy’ in following manner:

- the right to be left alone, or
- the right to exercise control over one’s personal information, or
- a set of conditions necessary to protect our individual dignity and autonomy.\textsuperscript{417}

Again, according to the view of Schoeman, ‘privacy’ can be seen as:

the protector of reputations and sanities, a developer of intimate and personal relationships, and even a defender of hard-done-by individuals maltreated at the hands of overly bureaucratic government departments.\textsuperscript{418}

Moreover, according to the ALRC Privacy Report, ‘the term privacy can be used to describe a genus of interests for which there is a strong claim of protection’.\textsuperscript{419} Privacy can also be defined as an inviolate personality, as associated with the notions such as ‘individual dignity and integrity, personal uniqueness and persona; autonomy’.\textsuperscript{420} Bloustein argued in favour of:

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\textsuperscript{416} Ibid.

\textsuperscript{417} Office of the NSW Privacy Commissioner, \textit{What is Privacy} (28 February 2007) Lawlink New South Wales <http://www.lawlink.nsw.gov.au/lawlink/privacy NSW/ll_PNSW.nsf/pages/PNSW_04_faqprivacy>. The concept of the ‘right to be left alone’ is a dimension that appears to have originated in the US and there been explored. Judge Cooley argued that one of the earliest and best known definitions of privacy is ‘the right to be let alone’. For further details, see Judge Thomas M Cooley, \textit{The Right to Be Left Alone}, Law of Torts (2\textsuperscript{nd} ed, 1880). Around the same time that Warren and Brandeis published their article [which referred to Cooley in 1890], the Supreme Court [also] referred to the right to be let alone in holding that a court could not require a plaintiff in a civil case to submit to a surgical examination: “As well said by Judge Cooley: ‘The right to one’s person may be said to be a right of complete immunity; to be let alone’”, \textit{Union Pac Rly Co v Botsford}, 141 US 250, 251 (1891), cited in Daniel J Solove, ‘Conceptualising Privacy’ (2002) 90 \textit{California Law Review} 1087, 1100. See also A W Goldsworthy, ‘The Invasion of Privacy—Its Administrative Impacts’ (1974) 33 \textit{Australian Journal of Public Administration} 9, 10.

\textsuperscript{418} Schoeman, above n 412, 1, cited in Laurie, \textit{Genetic Privacy}, above n 205, 40.


... the principle of “inviolate personality” to posit the individual's independence, dignity and integrity; [which] defines man’s essence as a unique and self-determining being. 421

According to Bloustein, ‘respect for these values’ both grounds and unifies the concept of ‘privacy’. 422 The ethical principle of autonomy or individual self-governance is, therefore, linked to the concept of privacy because autonomy is only possible where there is a sphere of privacy. 423 Anderlik and Rothstein further argued that the concept of ‘privacy has both intrinsic and instrumental value’. 426

Prior to the wedding of Samuel Warren’s daughter in 1889, the ‘legal concept of privacy’ did not exist. 427 The legal justification for the ‘concept of privacy’ is traced back to Samuel Warren and Louis Brandeis’s 1890 Harvard Law Review article ‘The Right to Privacy’, which had been prompted by personal experience. Warren and Brandeis launched an ‘impassioned attack on invasive press practices’, where they argued that ‘the press’s penchant for inane and intrusive gossip should be met with aggressive new legal controls to restore civility and common decency’. 429 Warren and Brandeis also argued that solitude and privacy are essential for individuals and the individual ought to have a right of action in order to prevent interference with their inviolate personality. 430 This has contributed to the formation of privacy jurisprudence. From the legal perspective, the concept of ‘privacy’ has also been recognised as an important human right by various international legal

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422 Schoeman, above n 412, 18; see also Bloustein, above n 421, cited in Laurie, Genetic Privacy, above n 205, 49.


424 Intrinsic value is linked to the ‘ethical principle of autonomy or individual self-governance’ and protection of such value is required both because it will produce good consequences as well as a good and meaningful human life would be impossible without it, for further detail see ibid.

425 Instrumental value—the protection for which will produce some good outcomes or consequences, for further details see ibid.

426 Ibid.


428 Schoeman, above n 412, 1.


instruments. The *Universal Declaration of Human Rights (UDHR)*, 1948, has recognised the concept of ‘privacy’ as one of the important human rights. Article 12 of the *UDHR* provides:

No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour and reputation. Everyone has the right to the protection of the law against such interference or attacks.

The essence of this has subsequently reflected in the *International Covenant of Civil and Political Rights (ICCPR)*, 1966, and in the *European Convention for the Protection of Human Rights and Fundamental Freedoms*, more popularly known as the *European Convention on Human Rights (ECHR)*. The spirit of the *ECHR* is exemplified in its eighth Article:

Everyone has the right to respect for his private and family life, his home and his correspondence. There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.

In addition, decisions of the European Commission of Human Rights, the European Courts of Human Rights, and the United Nations Human Rights Committee have ‘produced a formidable body of jurisprudence elaborating privacy as human rights’. Attention has been drawn to the international as well national implications. As early as 1980, the Organisation of Economic Cooperation and Development (OECD) Council ‘recommended guidelines for the protection of privacy and trans-border flows of personal privacy’. Similarly, many other international and regional instruments have recognised and protected the same object. In compliance with these human rights instruments, all signatory states have enacted relevant national legislation for privacy protection. Privacy can therefore, be claimed as a fundamental human right which is recognised in a number of major international treaties and

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431 UDHR, UN Doc A/810.  
432 ICCPR art 17(1).  
433 ECHR.  
434 Ibid art 8(1) and (2).  
436 Ibid 3[2].
agreements. The concept has also been recognised in diverse regions and cultures. Nearly every country in the world includes privacy as a right in their Constitutions. Finally, a right to privacy can be articulated as ‘a right to maintain a certain level of control over the inner spheres of personal information and it is a right to limit public access’ to the personal information (that is, the core self) that one never discloses to third parties other than the family members.

Viktor Mayer-Schönberger argued that privacy is ‘a bundle of very different underlying values’. Kang identified three such values — physical privacy, decisional privacy, and informational privacy. Scoglio has added a fourth category, which he terms ‘formational privacy’. Anita Allen also added another value, that of proprietary privacy. Roche and Annas have commented that different jurisdictions apply different types of privacy according to their contexts and requirements. Thus, privacy can be categorised in a number of ways: physical privacy, ‘informational privacy, relational privacy, decisional privacy’. Some widely accepted forms are discussed below:

‘Physical privacy’ is related to human body and it is a right to non-interference with a person’s body without the permission of that person. This right can be

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444 ‘Respect for this can imply, … that … [people] have a “right to choose what happens in and to … [their] bodies”, as some people have claimed in the abortion debate’: Matti Hayry and Tuija Takala, ‘American Principles, European Values and the Mezzanine Rules of Ethical Genetic Databanking’ in Matti Hayry et al (eds), The Ethics and Governance of Human Genetic Databases European Perspective (Cambridge University Press, 2007) 11, 18; see also Roche and Annas, above n 439.
invaded by the taking of biological samples and fingerprints without someone’s consent or by searching their bag, and in many more ways. Here the principle of respect for bodily integrity comes into play. It is a basic ethical and legal principle that a person has the right to control access to his or her own body and that intervention in the body requires explicit consent.

‘Informational privacy’ involves the ‘establishment of rules governing the collection and handling of personal data such as bank information, medical and government records. It is also known as data protection’. There are other types of information privacy, for instance, medical, financial, internet privacy.

Laurie elaborates on two types of privacy, defining them as ‘spatial’ and ‘informational’ privacy. ‘Spatial privacy’ is ‘a state of separateness from others’ and ‘[s]uch a state encompasses both physical and psychological separateness’, a state where no access is granted. It relates to the sphere of the self — a zone of privateness surrounding the individual that cannot and should not be invaded without due cause’. On the other hand, ‘informational privacy’ according to Laurie is a separateness of personal information. He further argued that:

[P]ersonal information in an intimate adjunct to individual personality. Respect for personal information is a means to demonstrate respect for the individual herself. Informational Privacy implies the denial of access to personal (health) information to those to whom the information does not relate, and to attribute value to informational privacy, as we do by legal means, is to recognise the interest of patients in maintaining information in a state of non-access and preventing unauthorised use or disclosure of that information to others.

The Canadian Task Force on Privacy and Computers has categorised three different types of privacy: ‘territorial privacy’, ‘privacy of the person’ and ‘privacy in the

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447 Ibid.
448 Roche and Annas defined informational privacy as ‘having control over highly personal information about ourselves’. For further details, see Roche and Annas, above n 439, 392.
450 Ibid, *Genetic Privacy*, above n 205, 6, 64.
451 Ibid 64.
452 Ibid.
453 Ibid.
information context’. They defined the term ‘territorial privacy’ as a claim of privacy in a territorial and spatial sense and historically, legally and conceptually related to property. In this form of privacy there is a physical domain within which nobody is allowed to enter without the owner’s permission except by legal warrant. In the second sense ‘Privacy of the person’ is a claim for privacy of one person against physical assault and unwarranted search and seizure. This concept is similar to ‘physical privacy’ or the idea of ‘spatial privacy’. Finally, the third category is ‘privacy in the information context’. The notion of privacy in this sense is derived from the idea that all information about a person is their own and that person can control the communication or retention of such information according to their wish. This idea is similar to the Laurie’s ‘informational privacy’.

In addition, there are some other forms of privacy, such as ‘privacy of communications’. This covers the security and privacy of mail, telephones, e-mail and other forms of communications. However, this study, particularly this section, has focused on ‘informational privacy’ interests, that is, an interest in controlling access to and use of someone’s personal information by others. These aspects of privacy are relevant and most commonly referred to in the discussions about ‘genetic privacy’.

From the above discussion it can be argued that concept of right to privacy has been widely accepted in a number of jurisdictions across the world both theoretically and legally. The completion of the human genome projects and developments in genetics have presented significant challenges in the areas of privacy and confidentiality. This is because developments in genetics and genetic technology over the past decade have prompted a wide range of use of human genetic information in various contexts. As ‘genetic information is connected to personal and group identity, the protection of

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454 Dowding, above n 449.
455 Task Force Jointly Established by the Department of Communications and Department of Justice, 'Privacy and Computers' (Information Canada, 1972) 13–14, cited in Australian Law Reform Commission, Privacy, above n 419, 21 [47].
456 Ibid.
457 Task Force Jointly Established by the Department of Communications and Department of Justice, 'Privacy and Computers' (Information Canada, 1972) 13–14 cited in Australian Law Reform Commission, Privacy, 419, 22 [47].
458 Dowding, above n 449. See also Lawrence Öqvist, above n 449.
genetic privacy is an important individual and social priority'. Therefore, the concept of privacy has been extended due to the technological developments, changed circumstances and needs of human life. The scope of privacy now extends to cover this newly developed concept of ‘genetic privacy’. The following section will give an overview about this newly emerged idea: ‘genetic privacy’.

### 3.1.2.2 Genetic Privacy: A New Conceptual Development

The concept of ‘genetic privacy’ is only a recent development. DNA scientific and technological advances have ‘provided the means to gather and manipulate genetic information’.

The application of advanced technology at multiple levels has improved and accelerated the collection, analysis, understanding, and retention of DNA samples and profiles. In her article, Skene remarks that genetic technologies have raised new questions about the right to privacy. The advances have made genetic information an immediate and accessible source of information about the human body. Today genetic testing has become far less expensive and various bodies have made access to DNA analysis and different types of uses of genetic information publicly available (for example, paternity testing). The chances of misuse due to this kind of easy access cannot be ignored. According to Makdisi:

> Because human tissues are so easily accessible, the latest tests based on newly-discovered information can be applied to invade the genetic privacy of unwitting and unwilling targets.

The concept of ‘privacy’ has therefore been redefined, while another right or claim has been raised in the name of ‘genetic privacy’. This new form of privacy has drawn global attention.

**(a) Genetic Privacy**

The concept of genetic privacy is one of the important and multifaceted contemporary scientific, philosophical, ethical, legal and human rights issues. However, it is not easy to define precisely what it comprises. Various legislatures and scholarly publications have outlined the idea and scope of the concept of ‘genetic privacy’.  

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460 Anderlik and Rothstein, above n 423, 404.  
461 Laurie, Genetic Privacy, above n 205, 25.  
privacy’ depending upon its applicability, context and necessity. In general, genetic privacy means ‘the protection of genetic information about an individual, family, or population group from unauthorised disclosure’.\(^{464}\) According to Balint’s definition of genetic privacy or privacy of genetic information means ‘protection against unauthorised access to personal medical information by individuals or organisations’.\(^{465}\) In other words, the concept is related to the maintenance of the privacy of one’s health information or clinical records or medical data which is derived from the analysis of particular DNA samples.\(^{466}\) Labacqz has further defined the term:

[Genetic privacy] ... does not only imply the right to keep others from accessing and using one’s genetic information ... [it] also includes the right not to share information with others, ... the right not to know one’s own genetic fate, as well as the right to use information in accordance with one’s own values.\(^{467}\)

Protection of genetic privacy therefore involves controlling the acquisition, use and disclosure of an individual’s genetic information. The reason for its protection is the sensitive nature of the information: genetic information is personal, often highly sensitive as well as familial,\(^{468}\) and has an influence on human life, health, employment, ability to obtain loans, marriageability, reproductive choices, adoption, and law enforcement.\(^ {469}\) Every individual has the right to keep their genetic information private from outside interference, unless there is an overwhelmingly good reason to breach it (for example, where persons refuse to supply material for genetic analysis where circumstantial evidence points to their being a suspect in a murder).


\(^{466}\) Lou Anne Cummings, 'Genetic Privacy and Academic Medicine: The Oregon Experience' (2001) 76 Academic Medicine 1089, 1091.


\(^{468}\) Skene, ‘Genetic Privacy’, above n 462, 23.

McIlroy argued that the concept of ‘right to be left alone’ can be interpreted with regard to genetic privacy or protection of genetic information in three ways. Firstly, third parties or others should not be able to use someone’s genetic information in ways which interfere with that person’s normal way of living. Secondly, genetic privacy is such a right that prevents others from having unauthorised access to one’s genetic information, regardless of the uses to which it is put (a broader area is, therefore, included). Thirdly there is the issue of consent: a person’s privacy could be interfered with by information being given about that person’s genetic makeup without their consent. That means the idea of ‘right to be left alone’ can also be used in cases where if a person ‘does not want to know’ about their own genetic make-up, nobody (including law and state mechanisms) should be able to force that person to know about their own DNA information. Moreover individual autonomy is a central ethical principle and owing to this ethical value every individual has ‘the right to determine what he wants to know about his own genetic constitution and what he does not want to know’.

However in practice, it is often difficult to respect the principle of individual autonomy — the ‘right not to know’ about someone’s genetic status in an absolute sense. This is because family members have a common interest in the knowledge as they share at least some of the same genetic information similar to that of the DNA sample holder. Therefore it is the duty of law or state to protect the interest of the family members, his relatives or an entire ethnic group — ‘who might also be concerned’ — without undermining the individual’s right to self-determination. George Annas argued that as ‘an individual’s DNA can also reveal information about risks and traits that are shared with genetic relatives’, the Convention on Human Rights and Biomedicine also supports this idea, particularly protecting the patients’

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470 Judge Cooley, The Right To Be Left Alone, Torts (2nd ed, 1880), cited in Goldsworthy, above n 417.
474 Ibid.
interest. Due to the shared interest in the genetic information, that right to privacy does not belong to an individual only, but also to the whole family, to the immediate members of the family as well as other relatives who have a shared interest in that genetic information.

One of the significant reasons for genetic privacy protection is the possible psychological harm or stress that disclosure may have on those who may only later in life suffer from a particular condition or whose descendants might be affected. In order to enjoy genetic privacy, one needs to have control over one’s genetic sample and information. In this regards, the US draft Genetic Privacy Bill 1995 provided a definition of the term ‘private genetic information’:

'It] means any information about an identifiable individual that is derived from the presence, absence, alteration, or mutation of a gene or genes, or the presence or absence of a specific DNA marker or markers, and which has been obtained: (1) from an analysis of the individual's DNA; or (2) from an analysis of the DNA of a person to whom the individual is related.478

The Bill also provided that ‘individuals own their own DNA, and no one else can use your DNA without your authorisation’. Such control or authorisation needs to extend over the use of genetic information, including what can be done with it and by whom and in what circumstances. It involves the right to control how information about oneself should be used by those to whom it is disclosed. As McIlroy observed, ‘[t]his right can be described as positive since it does not just prevent others from infringing such right but also it gives the individual additional claims on their genetic

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477 Skene, 'Genetic Privacy', above n 462, 23–4. See also Skene, ‘Legal Regulation of Genetic Testing’, above n 455, 209–10; Walther Ch Zimmerli, 'Who Has the Right to Know the Genetic Constitution of a Particular Person?' in Derek Chadwick, Greg Bock and Julie Whelan (eds), Human Genetic Information: Science, Law and Ethics (John Wiley and Sons, 1990) 93, 100.

478 Genetic Privacy Act (Bill) ('GPA Bill') § 3(m) (1995); see also Thomas H Murray, 'Genetic Exceptionalism and Future Diaries: Is Genetic Information Different from other Medical Information?' in M A Rothstein (ed), Genetic Secrets: Protecting Privacy and Confidentiality in the Genetic Era (Yale University Press, 1997) 61, 68

information’. Hustead and Goldman have provided four interrelated components involved in protecting the privacy of genetic information:

Access: Who should have access to a person’s genetic information, under what circumstances and for what purposes?
Use: How should those who obtain a person’s genetic information be allowed to use it?
Disclosure: To whom should those who obtain/create/receive genetic information be allowed to disclose it, and for what purposes?
Storage/security: What safeguards and safety precautions should be in place to make sure that genetic information is not obtained, used or disclosed inappropriately?

Answers to these questions could appropriately define the zone of genetic privacy or, in other words, the protection of genetic information. The noble concept of ‘genetic privacy’ is proposed by Laurie in his book of ‘Genetic Privacy: A Challenge to Medico-Legal Norms’. Pamela Sankar has commented that:

Many socially salient genetic features of a person, such as stature, coloring, and “looks,” are visible and rarely categorised as sensitive information. Much routine medical record content is genetic as well, such as family history data ... . Genetic privacy laws in the United States, designed to demarcate sensitive genetic information, often define genetic information as the results of DNA-based tests.

Further according to Charles Lawson:

Genetic privacy may be defined, ..., as the confidentiality that should attach to genetic information — the information contained in genetic materials which exist in various forms in biological organisms. When considered at the level of the individual this includes genotype, phenotype, mutation and sequence information, and when considered at the level of genetic compositions it includes individuals, communities, populations, species and so on.

In addition, the Australian Information Privacy Principles of the Privacy Act 1998 (Cth) includes genetic information as ‘protected personal information’. Section 6 has defined personal information as:

480 McIlroy, above n 471, 48.
482 See generally Laurie, Genetic Privacy, above n 205.
Information or an opinion (including information or an opinion forming part of a database), whether true or not, and whether recorded in a material form or not, about an individual whose identity is apparent, or can reasonably be ascertained, from the information or opinion.

Various scholars have provided a ‘zone of genetic privacy’, while others have supplemented some parameters which can protect the genetic information, in other words ‘genetic privacy’. However no specific legal definition or zone of genetic privacy is provided by any national legislation or international instrument. The possible reason could be that it is difficult to define this idea precisely due to the changed and changing nature of genetic information in terms of both technological advances and uses. Therefore it can be argued that genetic privacy is an ambiguous phrase and there is no single correct definition for it. As part of an effort to protect the privacy of genetic information, policy makers decide who should have access to a person’s genetic information, how such information should be used and what safeguards should be placed to prevent misuse. While taking such decisions, policy or law makers should consider the circumstances and context of the use of such sensitive information.

For Allen, there are

four different types of genetic privacy (in other words ‘the right to limits on access): (i) informational privacy of personal information, (ii) physical privacy of the body, (iii) decisional privacy in making personal choices, and (iv) proprietary privacy and ownership interests in bodily information or body parts.\(^{485}\)

Krimsy and Simoncelli have added two further categories of genetic privacy: (i) familial or relational privacy and (ii) spatial or locational privacy.\(^{486}\)

Among them, two important forms of genetic privacy are: ‘physical genetic privacy’ and ‘informational genetic privacy’. In this regard Graeme T Laurie’s concept of physical spatial privacy can be referred to and, according to Laurie, ‘in the context of genetic information, … spatial privacy can be invaded by the revelation of genetic data about an individual to that self-same individual’ and/or it can be ‘invaded by

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\(^{485}\) Allen, ‘Genetic Privacy’ above n 443.

\(^{486}\) Krimsy and Simoncelli, above n 253, 228–9, 232.
unsolicited disclosure of genetic information the proband or relative him - or herself. 487 Such privacy, therefore, ensures that the ‘individual herself is in [and retains] a state of non-access or separateness’. Such ‘physical spatial privacy is invaded’, for example, where individuals ‘are not permitted to be alone’. 488

Similarly, in the case of physical genetic privacy, third parties are not generally allowed to seize, search or touch the body of the information holder or data subject to collect DNA samples or genetic data unless he or she has given permission to do so and that permission or consent has to be ‘informed consent’. In exceptional circumstances family members or third parties can do so without the person’s permission, for example where family necessity (such as, for treatment purposes) or public interest is at stake (such as, for detecting criminals). As Kirby observes, family members are usually categorised as ‘third parties’ but that ‘recent international statements have begun to recognise the possible need ... [for] a new sub-classification’, one that is attentive to ‘the special position of those third parties who are family members in the same genetic group’. 489

Informational genetic privacy implies that certain types of personal and sensitive information cannot be obtained, stored or accessed without the permission of the data subject. Moreover, the databases which store that information should not disseminate or share with third parties except for the benefit of the information holder or in circumstances where it is deemed necessary in the public interest. Finally it can be argued there is no zone or forms of absolute or unconditional privacy.

Some concepts are interrelated with the concept of ‘privacy’ and ‘genetic privacy’ and it is essential that these are examined. ‘Confidentiality’, ‘informed consent’ and ‘autonomy’ or dignity’ are some essential elements of privacy, more particularly genetic privacy. According to Gavison, there are three elements to privacy: secrecy,

487 Laurie, Genetic Privacy, above n 205, 65, 128 (citation omitted).
autonomy, and solitude.\textsuperscript{490} Moreover, such a concept is based on principles of human dignity and respect for individual freedom.\textsuperscript{491} These claims require close scrutiny; and in order to conduct this scrutiny adequately, it is necessary to consider all these key principles, values, and factors that are of relevance to resolving the conflicting dynamics in the genetic privacy sphere. The following section will discuss ‘confidentiality’, ‘informed consent’ and ‘autonomy’.

3.1.2.3 Confidentiality, Informed Consent and Autonomy

(a) Confidentiality
The right to privacy requires the enforcement of a right to ‘confidentiality’. It can be considered an essential branch of privacy. Though the term ‘privacy’ is linked with the term ‘confidentiality’, there is clear distinction between the two. The term privacy refers to the freedom of an individual to choose or his right to control the ‘extent, timing and circumstances’ of sharing himself (physically, behaviourally, or intellectually) and/or his information with others. On the other hand, the idea of confidentiality is involved in many statements of professional ethics. These indicate an explicit promise or contract is made by the professional in their fiduciary relationships — (for example, in a doctor–patient relationship, researcher–data subject, court-appointed defence lawyer–suspect) — not to disclose anything about the individual concerned except under conditions agreed upon. Such an individual has disclosed his private information in a relationship of trust and with the expectation that it will not be divulged to others without his permission.\textsuperscript{492} ‘Confidentiality’ therefore focuses on maintaining trust between two individuals, whether this is in an intimate (for example, marriage) or a fiduciary relationship. ‘Confidentiality is a person’s claim to keep private the secrets exchanged in the course of that relationship, enforced not simply to respect the person whose confidences are divulged but also to underscore the importance of relationships of trust’.\textsuperscript{493} According to Otlowski:

\textquote{\quotesys{[C]onfidentiality’ refers to an obligation arising in certain relationships whereby the recipient of personal information about another is under an}}

\textsuperscript{490} Gavison, above n 414, 351.
\textsuperscript{491} Bris and Knoppers, above n 410, 419.
\textsuperscript{492} Max Seigal, 'Privacy, Ethics, and Confidentiality' (1979) 10 Professional Psychology 249, 251.
obligation not to use that information for any purpose other than that for which the information was given.  

Confidentiality facilitates free and open disclosure that would not otherwise occur and sets parameters for and mediates a relationship where one party often has a position of greater power and/or knowledge to the other in that relationship. One of the widely accepted fiduciary (trust) relationships is the doctor–patient relationship. Confidentiality is the duty of the health care professional and the right of the patient. Indeed, ‘one of the most fundamental ethical principles of medical practice is the keeping of patients’ secrets or the obligation of confidentiality’. If it is recognised that, as Justice Kirby observes, that genetic information as ‘a subset of medical ... information about an individual’, then it is ‘prima facie entitled to the same protections for privacy and confidentiality which, from the time of Hippocratic Oath, have bound health personnel to respect all information secured in the health care relationship’. The provisions of Hippocratic Oath have governed doctor–patient relationship since the 5th century BC. Privacy is primarily in the patient’s interest and confidence is in the mutual interest of the contracting parties. This is because patients normally approach the doctor in pain and in a vulnerable condition, but with full confidence and trust that his or her health condition will not be disclosed to any third parties, that is, confidentiality will be observed.

There are two types of confidentiality — ‘absolute confidentiality’ and ‘qualified confidentiality’. ‘Absolute confidentiality’ means that information which cannot be made public or disseminated under any circumstances to any unauthorised parties. This kind of absolute confidentiality is difficult to apply in practice. Laurie argued that, at least in the UK jurisdiction, ‘the duty of confidentiality is not absolute,’ because certain exceptional circumstances and emergencies exist that bar absolute confidentiality, and there are times where it becomes indispensible to disclose the information to some third parties. Breach of such confidentiality is justified when it occurs, in the interest of the patient or their family members, or even for public

494 Otlowski, above n 459, 89.
496 Kirby, ‘Genetic Privacy: Looking Backwards’, above n 489.
497 E Ian Thompson, 'The Nature of Confidentiality' (1979) 5(2) Journal of Medical Ethics 57, 60.
498 Laurie, 'In Defence of Ignorance’, above n 472, 126; see also Lesser and Pickup, above n 495, 17–28.
interest. ‘Qualified confidentiality’ is the type of confidentiality most widely used one. Similar to the qualified confidentiality applicable to medical information that may affect non-blood relatives (for example, spouse or partner where an sexually transmitted disease detected, or in regard to threats to life where the identity of the person at risk is disclosed to a relevant professional), qualified confidentiality may be applicable to genetic relatives in regard to genetic information. Blood relatives should have a highly restricted right to access to each other’s genetic records where, for example, their own health or that of their children is or may be endangered (for example where a party has a carrier status for cystic fibrosis confirmed by DNA testing) and therefore otherwise confidential genetic information can be shared among family member or relatives under certain circumstances. It may be considered by some family members (but not others) that the confidentiality of that information should be restricted to the familial group.

According to Common Law principles, the concept of confidentiality is mainly applicable to fiduciary relationships. Nevertheless, with further interpretation, such a concept can be applied to the forensic use of DNA data. When there is an issue regarding the protection of sensitive information, the concepts of privacy and confidentiality come to the fore. Moreover, the creation of large forensic DNA databases poses problems in regard to the security of sensitive information and how such data should be protected against unauthorised use. In the vast majority of instances people voluntarily provide their DNA samples with assurance that their information will be kept confidential. With regards to genetic samples, although there is no such fiduciary relationship established between law enforcement or forensic department and DNA sample providers, it is important to protect confidentiality because genetic information is more susceptible and vulnerable than any other health information and of particularly high value. In addition in the absence of an intimate relationship, equity imposes a confidentiality obligation on

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499 Lesser and Pickup, above n 495.
501 For example, some members may believe that it not in the interests of their children that an increased familial risk for Alzheimers, cystic fibrosis, or childhood leukaemia is disclosed more generally.
the recipient (that is, law enforcers or forensic department. It is therefore necessary to respect confidentiality of genetic information of suspects and/or victims.

With regards to the right to confidentiality, Leo Tsaknis argued that the duty of confidence arises from the principle of equity and such duty is based on the broad principle of ‘good faith’ — whereby he who has received information in good faith shall not take unfair advantage of it. Furthermore Justice Megarry, in the case of Coco v Clark, has articulated that there are three elements for determining what should constitute a breach of confidence:

First, the information itself must have the necessary quality of confidence about it. Secondly, that information must have been imparted in circumstances importing an obligation of confidence. Thirdly, there must be an unauthorised use of that information to the detriment of the party communicating it.

The nature of genetic information is such that it requires confidentiality, and in a forensic context, the recipient (that is, law enforcement entities or forensic DNA databases) is aware that the information was being given to them upon reasonable grounds (for example, to guarantee public security) in confidence. DNA data or genetic information presents the elements elucidated by Coco v Clark, and the concept of confidentiality is therefore applicable to such sensitive DNA data. The principle or right of confidentiality is therefore neither confined solely to the existence of a fiduciary relationship nor to the existence of a contract between the parties. The core idea is that the existing principle of confidentiality is adequate and it should be extended to include the new context and accommodate the advances of technology and scientific progress. Finally, it can be argued that for the sake of public interest and benefit of humankind, there should be a higher degree of confidentiality while handling and using human DNA samples and information.

(b) Consent and Informed Consent

The principles of ethics — which is a sub-branch of applied philosophy — determine what is ‘the right or the wrong, the good or the bad set of behaviours in a given

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503 Coco v A N Clark (Engineers) Ltd [1969] RPC 41, 47.
and medical ethics deals primarily with the medical practitioners ethics in the doctor–patient relationship. The principles of bioethics (which has been described as a ‘quasi-social science’) is at once more broad in that it can refer to broader areas of scientific interest and more narrow as it as bioethics is generally understood to offer resolutions to moral or ethical problems arising from research involving human subjects in medical and biological science practice. The Preamble to the Eubios Declaration for International Bioethics highlighted that ‘life and medical sciences present many important educational, ethical, legal and social issues, which need to be considered at local, national and international levels’. Several principles for international bioethics have therefore adopted to address such issues and among these, ‘consent’, is considered the pivotal principle of bioethics. This principle requires that individuals must be provided with all of the relevant information in the appropriate context and they should be provided enough freedom to make their own autonomous decisions. Voluntary informed consent is therefore the ‘core ethical principle of human ethics’. The first of the ‘Belmont principles’ (those identified by the Belmont Report) is ‘respect for persons’. This requires that research subjects be given the opportunity to decide what will or will not happen to them. This opportunity occurs in the informed consent process.

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506 Aksoy and Tenik, above n 504.
509 See generally T L Beauchamp, 'Methods and Principles in Biomedical Ethics' (2003) 29 Journal of Medical Ethics 269, 269–74; Tom L Beauchamp and James F Childress, Principles of Biomedical Ethics (Oxford University Press, 5th ed, 2001) 78; see also Belmont Report.
informed consent is also contained in the *Nuremberg Code*,\textsuperscript{513} the *Declaration of Helsinki*,\textsuperscript{514} and in the *International Ethical Guidelines for Biomedical Research Involving Human Subjects*, Guideline 4 of which says:

> Informed consent is a decision to participate in research, taken by a competent individual who has received the necessary information; who has adequately understood the information; and who, after considering the information, has arrived at a decision without having been subjected to coercion, undue influence or inducement, or intimidation.\textsuperscript{515}

This definition embodies five elements of informed consent: (i) competence; (ii) disclosure; (iii) understanding; (iv) voluntariness; and (v) consent.\textsuperscript{516} In the area of medical research, ‘informed consent is mandatory before extracting or using an individual’s biological material’.\textsuperscript{517} Informed consent in this sense ‘occurs if and only if a patient or subject, with substantial understanding and in substantial absence of control by others, intentionally authorises a professional to do something’.\textsuperscript{518} It is therefore the basic ethical and legal principle that every individual has the right to control access to his or her own health information, including DNA, and this kind of right to control information requires prior and informed consent.

Generally the term ‘consent’ means permission to seek, store and disseminate any information about individuals and it can be obtained in many ways. The Australian ‘National Statement on Ethical Conduct in Research Involving Humans’\textsuperscript{519} describes the lofty principles upon which the necessity to obtain consent rests. These principles are that every human being has inherent value and the autonomy to determine his or her own path in life. This means that before a person becoming involved in activities

\begin{itemize}
\item \textsuperscript{516} Beauchamp and Childress, above n 509, 79. Kristinsson and Vilhjálmur, above n 501, 201.
\item \textsuperscript{518} Beauchamp and Childress, above n 509.
\item \textsuperscript{519} *National Statement on Ethical Conduct in Research Involving Humans* 1999.
\end{itemize}
related to either research or before providing DNA samples, the consent of an individual is essential and such consent must be prior to the research activity being conducted, and it must be voluntary, free and informed (that is, participants must be adequately informed about what is happening and understand what will happen to the information gained). Some EU instruments also require that the ‘consent of the data subject should be free, express and informed’ (emphasis added). The addition of ‘express’ indicates an awareness and a requirement that consent cannot be implied by simple participation but rather consent must be definitely stated by the participant. Although specificities vary according to the purpose for which consent is being sought, authorities generally agree that there are three basic requirements necessary for informed consent. Firstly, the participant must be provided with detailed and explicit information regarding the purpose, risks, benefits and outcomes of the proposed activity or use of information derived. Secondly, the person giving the consent should be competent to do so. And thirdly, consent should be given voluntarily, that is free from explicit or implicit coercion. These rules are also applicable in the context of forensic use of DNA data; however, they may be circumscribed by legal warrants allowing action such as DNA sampling without the subject’s consent where matters of public interest or public safety are involved or in relation to certain categories of persons (for example, serious offenders).

520 According to the National Health and Medical Research Council, ‘Prior consent’ means consent which is obtained before the research is begun: National Health and Medical Research Council Australian Government, 'Challenges Ethical Issues in Contemporary Research on Human Beings' (December 2006) 59.
521 ‘Free consent’ means consent is not obtained using force or coercion, or by improper inducements, the definition provided by the National Health and Medical Research Council. For further details see ibid.
522 According to the National Health and Medical Research Council, ‘informed consent’ is based on an understanding of what is to be done, why, and what will happen to the results: ibid.
523 Convention on Human Rights and Biomedicine arts 5–9; Recommendation No R (97) 5 on the Protection of Medical Data (Council of Europe and Committee of Ministers) (13 February 1997) recom 6.
525 NSW Ombudsman, The Forensic DNA Sampling of Serious Indictable Offenders Under Part 7 of the Crimes (Forensic Procedures) Act, Discussion Paper (December 2000) 6. See also Crimes Act pt ID div 6A ss 23XWC, 23XWK.
Further the term ‘informed consent’ is based on an understanding of what is to be done, why, and what will happen to the results. Offering participants the opportunity to make such free and informed decisions through informed consent is considered as showing respect for individual autonomy and human dignity. The Human Genome Organisation (HUGO) defined the term ‘informed consent’ as ‘notification of uses (actual or future), or opting out, or, in some cases, “blanket consent”’. In other words, informed consent operates as a form of ‘legitimisation’ of the activities undertaken by researchers and others while giving donors or suppliers of DNA material a certain degree of control. Informed consent actually ensures that the wishes of individuals giving their DNA samples for forensic purposes or any other research purposes are taken into account, that is, they can make decisions with regard to the access to and use of their bodily samples and their further use. This can extend to the use made of information derived from those samples. According to Beauchamp and Childress, there are seven elements of informed consent: namely ‘the threshold elements (which are pre-conditions of consent) (1) ‘competence, to understand and make decisions and (2) voluntariness in deciding; [and] the information elements (3) disclosure of material information, (4) recommendation of a plan, and (5) understanding of the information and the plan that is recommended; (6) decision in favour of a plan and (7) authorisation of the chosen plan’.

Consent can be given in many ways — ‘actual’, ‘implied’, ‘rational’ and ‘proxy’ consent. ‘Actual consent’ is the real or genuine permission of the individuals themselves to collect, store and disseminate their DNA samples or genetic data. ‘Implied consent’ means where the data subject has not actually consented, but where, from other circumstances or from their attitude, it can be presumed that they have consented on a particular issue. There is another form of consent which is called

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526 Division of Ethics of Science and Technology Bioethics Section, above n 494; see also Universal Declaration on Bioethics and Human Rights, Records of General Conference of UNESCO, Res 36, 33rd sess, vol I, ch v (adopted 19 October 2005) (“UDBHR”) also recognised ‘respect for human dignity’ and ‘principle of autonomy’: arts 3 and 5.
‘rational consent’. It can be used in cases where there is no actual or implied consent from the data subject, but it can be assumed that no rational person would object to having his or her DNA data collected and stored. Finally, ‘proxy consent’ is for situations where the individuals themselves are temporarily incapacitated, persistently incompetent or dead. Permission is generally obtained not from the person concerned, but from the family members or relatives. This form of consent is required in medical emergencies or in some cases when dealing with minors or persons of unsound mind (irrespective of whether this is due to mental illness, limited intellectual capacity or mental capacity otherwise affected (for example, by ingestion of drugs or alcohol)).

To protect genetic privacy from intrusions, it is important to impose a prohibition on the collection of genetic information without the informed consent of data subjects. A sample donated to biobanks or other databases may be stored and used over a number of years for a variety of purposes. Privacy could, therefore, be intruded upon through the retention and further use of DNA samples and profiles. In such a situation, a ban should be imposed on retention and dissemination of collected DNA samples and profiles without consent of participants, at the same time, is significant. In general, consent is required to obtain for specific purposes. So, voluntarily provided blood samples for intimate medical information, such as information on pregnancy, syphilis infection, and carrying an allele for sickle-cell anaemia and using that blood sample for other purposes without specific consent may violate the right to privacy. In the case of *Norman-Bloodsaw v Lawrence Berkeley Laboratory*, the US Court of Appeal for the Ninth Circuit ruled that:

> one of the most basic violations of one’s constitutional right to privacy is performing unauthorised medical tests... when the test involves intimate matters relating to one’s sexual and genetic history, the [US Constitution (4th, 5th and 14th amendments)] offers even greater protection."}

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531 Hayry and Takala, above n 444, 18–9.
534 Ibid; see also Cristina E Echevarria, ‘Employment Law—Norman-Bloodsaw v Lawrence Berkeley Laboratory: 135 F 3d 1260 (9th Cir 1998)’ (1999) 29(1) Golden Gate University Law Review 71, 74. Note: The non-consensual testing violated the employees’ rights under the ‘Due Process Clause’: ‘No person shall... be deprived of life, liberty, or property, without due process of law ...’. See *United
Informed consent is an important issue in case of DNA databases. Generally, it is presumed that before collecting, analysing and retaining the DNA samples as well as profiles for case investigation purposes, informed consent must be obtained (where possible) from suspects or victims. It can also be said that free, prior and informed consent is considered to be the pillar for protecting autonomy and privacy in every kinds of use of human genetic data, whether it is for the medical or scientific or forensic purposes. However, one of the vexed and complex issues with regards to informed consent is that scientific understanding is constantly evolving and it is impossible to know ‘what will be at the forefront of research agendas even in the not so distant future’.\textsuperscript{535} In the light of this dilemma the concept of informed consent needs to be reconsidered.

(c) Autonomy

Another important aspect of genetic privacy is the principle of ‘autonomy and self-determination’ and this is also an important aspect of bioethics (that is, ‘respect for persons’). This notion is very much related to the informed consent. In order to achieve respect for autonomy, one has to respect the principle of informed consent and \textit{vice versa}. Furthermore, the principle of ‘respect for integrity’ (which is related to human dignity) lays the foundation of the principle of respect for autonomy. This means that one ought to respect a person’s autonomy in order not to violate his or her integrity. The two principles of respect for autonomy and integrity and the principle of informed consent are seen as forming a triangle in biomedical ethics.\textsuperscript{536}

Etymologically, the word ‘autonomy’ is derived from the old Greek word ‘\textit{autonomos}’ (from the word \textit{autos} meaning ’self’, and the word \textit{nomos}, meaning ‘law’). Therefore the word autonomous means ‘self-rule or governance’.\textsuperscript{537} ‘Autonomy’ refers to a state of moral independence. It can also be described as ‘one’s decisional power over [one’s] own personal information and the use of it’.\textsuperscript{538}

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\textsuperscript{536} Hugaas, above n 530.

\textsuperscript{537} Ibid 66.

There is no single accepted definition of ‘autonomy’, although several writers have defined it, such as, Onora O’Neill who notes that the concept is mostly based on some notion of ‘independence and personal responsibility’. According to Kant, ‘autonomy’ means the distinctive human capacity for rational thought and action in accordance with the moral law.

The principle of respect for individual autonomy related to a person’s DNA sample or information is fundamental to any kind of medical or forensic practices. The way in which the source of information must be treated is also the cornerstone of many ethical and legal requirements. Among other things, the principle requires that data sources be consulted and their consent be sought to proceed with any kind of intervention or treatment of data, either for medical or criminal investigative purposes, and their wishes regarding the use of collected data be respected.

From the above discussion it can be argued that many international instruments and organisations have recognised the value of privacy. Though sometimes there is a dilemma in regard to the protection of the right of an individual to privacy as opposed to state security or national interest, the value of the individual’s protected zone of privacy cannot be ignored. While the importance of privacy (including genetic privacy) in health care as well as in research has long been recognised, the widespread use DNA information for justice delivery purposes has also generated particular concerns about protecting ‘genetic privacy’ in this sphere.

An individual’s relationship with society is determined in many ways, including by contemporary legislation, policies and technological developments. Consequently, an individual’s right to privacy is challenged by these newly constructed social and legal relationships. The right to genetic privacy is no exception. Anderlik and Rothstein point out that genetic privacy ‘has intrinsic value as a facet of autonomy,'
and respect for autonomy implies a duty to respect the genetic privacy of others’.\textsuperscript{542}

They go on to argue that:

> Within a legal framework, genetic privacy must be considered a fundamental right, and individuals should be able to block or seek redress for invasions of their genetic privacy by other people and by the government. Rules protecting the privacy of genetic information are intended to prevent, lessen, or eliminate negative consequences of the new genetics.\textsuperscript{543}

Although the rules for this new science have not yet been decided, there are a few steps that could be taken to address negative consequences. These actions include dealing with any kind of privacy violation through the involvement of concerned and interested parties (for example, ethicists, social scientists, lawyers, and representatives of affected communities and so on). Although there are laws protecting privacy of health information and prohibiting genetic discrimination in most jurisdictions, there are a number of discrepancies and gaps in these laws and in the ‘social safety net’.\textsuperscript{544} These issues need to be properly and promptly addressed.

### 3.1.3 RIGHT TO PRIVACY AND GENETIC PRIVACY: EXISTING LEGISLATIVE JUSTIFICATIONS

#### 3.1.3.1 Significance of Genetic Privacy

The impact of genetic technology on human privacy is a significant issue. The increasing availability and affordability of DNA testing, and the increase in the information derived from that testing, has meant that its use is now more widespread, and the accessible information is also more extensive, than ever before. This has led to recent increases in the sheer volume of genetic information storage or retention in DNA databases. The more individuals learn about their unique genetic profile through this proliferation of information, the greater is the risk to genetic privacy. This risk intensification necessitates greater protection of genetic privacy rights. Without privacy protection, an individual’s right to know, their right not to know, their social honour as well as reputation, and their right to make autonomous

\textsuperscript{542} Anderlik and Rothstein, above n 423, 404.
\textsuperscript{543} Ibid.
\textsuperscript{544} Ibid 427–8.
decisions about the disclosure of highly sensitive and consequential information is at risk.  

At this stage it is important to examine the significance of genetic privacy: how important and special this information is, and how far privacy protection of genetic information is recognised either in principle, or law or in practice, nationally and internationally. The following section will analyse the significance of genetic privacy, at first in general and then in the context of forensic use:

**(a) Genetic Exceptionalism: Whether Genetic Information is a Special Kind of Information or Not?**

The focus on ‘genetic privacy’ implies the notion of ‘genetic exceptionalism’, that is, that human genetic information is distinct, presents unique problems which require special treatment, and therefore warrants special recognition and protection. This idea remains somewhat controversial. The advocates of ‘genetic exceptionalism’ emphasis that genetic tests can forecast future health problems as well as can generate insights about current ones, which means that it raises particular issues with respect to privacy and discrimination. The proponents of this view support the notion that genetic information is exceptional or special and should be treated differently from other information. Therefore, it is important to understand that genetic information is different from other kinds of medical information as it is both ‘predictive’ and ‘familial nature’ and it causes greatest concern.

Conversely, the opponents of this view assert that genetic information is not fundamentally different from other types of health information and it is just another form of personal health information. It should therefore, come within the existing protection of health information. They argue against ‘genetic exceptionalism’. Organisation Economic Cooperation and Development in this regard argued that:

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545 Ekberg, above n 8, 9.  
546 Otlowski, above n 459, 91.  
547 Sankar, above n 483, 394.  
549 Legal and Social Implications of Human Genome Research NIH-DOE Working Group on Ethical, National Institute of Health and National Human Genome Research Institute, 'Task Force Report: Genetic Information and Health Insurance' (10 May 1993), cited in Murray, 'Genetic Exceptionalism'.
Genetic information is not unique in its ability to predict an individual’s future health. Rather, it provides a range of probabilities which need to be coupled with information on the individual’s lifestyle (e.g., smoker, heavy drinker etc) and other environmental factors (e.g., person lives near polluted river, electrical power lines etc) in order to obtain a clearer view of the individual’s health status.\textsuperscript{550}

However, the reality cannot be ignored that genetic information does have some distinctive characteristics and actual harm may be caused to individuals if this information is not adequately protected. Similarly, individuals’ right to genetic privacy and the right to control personal information (which includes the right to limit the collection, disclosure, and use of such information) can be protected by taking extraordinary care of their genetic information. Nevertheless, it is a significant fact that misuses of genetic information could also take place, particularly in the field of DNA profiling databases and criminal case investigation. While it is initially stored and used for forensic purposes, such privacy protection is also vulnerable and can be compromised. Because of the cumulative effects of these various characteristics of human genetic information, it can be argued that genetic information is exceptional and special care needs to be taken to protect the privacy of this type of information.\textsuperscript{551}

(b) Cultural, Religion and Economic Significance

DNA samples or biological materials also have some cultural or religious significance among different communities. For example, placental tissue is considered as having ‘spiritual life’ and it has vital cultural significance in many communities or cultures, such as in some parts of Malaysia, and including the fishing communities of Amarung (North Sulawesi).\textsuperscript{552} They believe it is the companion of the newborn and should be protected and respected. Such placentas are treated like a human life, and the same rituals are performed and same respects paid in regards to burial and memorials that are provided.\textsuperscript{553} In some places (such as Marquesas, in

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\textsuperscript{550} OECD, above n 445, 83.
\textsuperscript{551} Otlowski, above n 459, 94.
\textsuperscript{552} Gwynne L Jenkins and Jeremy Sugarman, 'The Importance of Cultural Considerations in the Promotion of Ethical Research with Human Biologic Material' (2005) 145(3) Journal of Laboratory and Clinical Medicine 118, 119.
\textsuperscript{553} Ibid.
some areas of Peru, and in Bengal both Muslim and Hindu women believe so), placental tissue is considered to have the ability to protect the mother and child, if appropriate treatment is given after delivery and, similarly, it could be harmful for them, if it is treated inappropriately. People from other communities want to preserve and bury the placenta in a particular place to indicate spiritual attachment with their land or ancestors (such as in the Tahitian community). In addition, some people treated their biological materials (such as blood or semen) as materials with super-natural properties. In other words, they are invested with aspects of an individual’s personality or identity. Respect for these persons cultural rights as well as their personal autonomy or ‘privacy’ rights means that the person’s right should be upheld and they be allowed the opportunity to treat such materials as would generally prescribed by their the particular community culture.

Economic significance is another reason where people want to control the treatment of their own bodily materials. For instance, the most significant judicial decision is given by the Supreme Court of California in the case of John Moore, rejecting his claim of a property right over his spleen cells, which had been violated when doctors removed spleen cells from his body in the course of treatment and did not share subsequent commercial gains with him. There is a big controversy: who should be regarded as the owner of genetic material supplied and information derived: the individual or the researchers? Apart from financial gain, some people want to control their body (their right to choose how their biological samples should be used) as a symbol of their ‘right to self-determination’.

In addition, there can be some economically significant genetic information derived from the samples by researchers for the researchers as well as for commercial enterprises. This is because after analysing genetic information, in many cases commercial enterprises or researchers extract unique kinds of data that may have

554 Ibid.
555 Ibid.
558 John Moore, 51 Cal 3d 120; 271 Cal Rptr 146; 793 P 2d 479 (Cal, 1990).
559 Alston, above n 557, 431.
commercial potential and thus they want to establish their exclusive rights over this
new discovery through patent protection. As a result DNA databanks or repositories
containing the DNA of sizeable populations can be termed ‘gold mines’ of genetic
information. Researchers and commercial enterprises thus have a strong interest in
going relatively easy access to DNA samples that have been stored for medical
records or perhaps for forensic investigative purposes. There is also a ‘considerable
interest on the part of biomedical researchers, companies that market genomic data,
and the pharmaceutical industry to stake claims on these informational resources and
to exploit them for their own purposes’. 560

(c) Creation of Genetic Sub-class: Genetic Discrimination and Stigmatisation
Disclosure and public access to genetic information can have some societal adverse
effects. One’s predisposition to a serious disease may create a psychological effect
both for individuals and their family members, particularly in the absence of any
effective treatments. It may also have societal negative implications for the person
concerned and may stigmatisate the entire group to which the individual belongs.
Misuse of the results of genetic testing has also the potential to undermine an
individual’s self-identity and sense of self-worth. Further, if it disclosed to
institutional third parties, such as insurers and employers, it may result in
discrimination against that person. For instance, an important Australian study on
genetic discrimination has found a total of 48 cases of alleged genetic
discrimination. 561 Information from a US Department of Defense Directive also
shows that ‘genetic information has been used to deny medical benefits to
retirees’. 562 Another US survey of 1500 genetic counsellors and physicians ‘reported
785 cases where patients had lost jobs or insurance coverage because of a genetic
condition or test’. 563 This evidence suggests that there are considerable effects of
genetic privacy on society, so much so that in the US some States have introduced
legislation regarding ‘employment legislation and genetic testing’. 564 In the UK in
the same period, legislation was reportedly passed confirming insurance companies’

560 Annas, ‘Genetic Privacy’, above n 475, 139.
561 Kristine Barlow-Stewart and David Keays, ‘Genetic Discrimination in Australia’ (2001) 8(3)
Journal of Law and Medicine 250, 251.
563 Everett, above n 467.
564 Ibid.
right to refuse coverage or increase premiums on the basis of predictive genetic testing.\textsuperscript{565} Although this merely brings the practices related to risk calculations by the actuaries of such companies into the 21\textsuperscript{st} century (as such practices had previously been the policy in regard to the information received from the applicant regarding their current disease status, and that of near relatives (including cause of death)), people are increasingly fearful that tests they had thought might help them prepare for the future may result in unforeseen negative impacts on their own and their families’ lives.

It would seem that some of these fears may now be materialising, with growing evidence of genetic discrimination occurring in the insurance, employment as well as the forensic arena and other contexts — on the basis of the use of DNA information. All the above mentioned aspects have caused an anxiety that with the new genetics revolution may emerge a new ‘genetic under-class’, a group or community who may be in the future given fewer opportunities given their ‘abnormal’ genetic condition/s — viewed differently by the broader society and even effectively socially segregated (that is, made subject to a range of ‘eugenic exclusions’ (insurance, health, housing, employment) and they and their parents made subject to a culture of ‘blame’\textsuperscript{566}

It is therefore important to uphold the intrinsic value of preserving the integrity, dignity and autonomy of individuals, and to protect genetic privacy. It is also necessary for the state to introduce effective mechanisms against genetic discrimination.\textsuperscript{567}

\subsection*{3.1.3.2 Legislative Justifications: International and National Level}

Everyday millions of DNA samples are collected for medical research and also for law enforcement purposes. Very often countries are required to share DNA data for detecting international terrorists and also for undertaking health care research (that is, to discover effective pharmaceuticals). Advances in IT and data technologies have contributed enormously in making such data sharing easier and faster. During the last

\textsuperscript{565} Ibid.
\textsuperscript{566} Ibid 55–6. Already some parents whose children are born with a genetically determined disability can be the subject of criticism for permitting the birth to occur and adults with similar conditions feel increasingly undervalued and unwanted. For a personal perspective, see Nicholas D Kristof, ‘The New Eugenics’ CCN.com.US (4 July 2003) \textltt{http://edition.cnn.com/2003/US/07/04/nyt.kristof/}.
\textsuperscript{567} Ekberg, above n 8, 9.
few years, the international community has introduced a range of regulations to safeguard individuals’ genetic privacy. The sensitivity of DNA information and the potential ease of access to it due to technological advances must be considered when the adequacy of current legal instruments and the standards regulating the use of genetic information are examined.\textsuperscript{568} This section provides a review of existing international rules and national regulations, and of a number of court decisions regarding genetic privacy within the context of forensic use.

(a) International Norms and Standards

The principal legal basis for the protection of human rights and privacy in relation to advances in genetic science and technology is found in the core instrument of human rights law, which consists of the \textit{Universal Declaration of Human Rights (UDHR)},\textsuperscript{569} the \textit{International Covenant on Civil and Political Rights (ICCPR)}\textsuperscript{570} and the \textit{International Covenant on Economic, Social and Cultural Rights (ICESCR)}.\textsuperscript{571} The ICCPR provides that no one shall be subjected to medical and scientific experimentation without their free consent.\textsuperscript{572} The ICESCR contains a number of broad principles applicable to the protection of human rights in the era of genetic advances.\textsuperscript{573} These three human rights instruments — the UDHR, the ICCPR and the ICESCR also emphasise the right to equal treatment, in other words respect for the principle of non-discrimination.\textsuperscript{574} The non-discrimination principle could serve as a powerful command for nations to prohibit discrimination on the basis of genetic predisposition or disabilities.

(b) Regional Conventions and Standards

\textit{European Convention for the Protection of Human Rights and Fundamental Freedoms}

\textsuperscript{568} Alston, above n 557, 426.
\textsuperscript{569} UDHR, UN Doc A/810.
\textsuperscript{570} ICCPR.
\textsuperscript{571} International Covenant on Economic, Social and Cultural Rights, opened for signature 16 December 1966, 993 UNTS 3 (entered into force 3 November 1976) (‘ICESCR’).
\textsuperscript{572} ICCPR art 7.
\textsuperscript{573} ICESCR art 2.
\textsuperscript{574} UDHR, UN Doc A/810, art 2; see also ICCPR art 26; ICESCR art 2.
At the regional level, the *European Convention for the Protection of Human Rights and Fundamental Freedoms (ECHR)*\(^{575}\) has also provided adequate protection for the right to privacy\(^{576}\) (including privacy protection of DNA data) and prohibits discrimination.\(^{577}\) Article 8 guarantees certain rights and fundamental freedoms including the right of respect for one’s ‘private and family life’.\(^{578}\)

Further, according to the principle of natural justice all kinds of rights concerning suspects or the accused should carefully be safeguarded until such persons are proved guilty. In this regard, reference should be made to a statement by noted English jurist Sir William Blackstone: ‘[B]etter that ten guilty persons escape, than that one innocent suffer’.\(^{579}\) The principle of ‘presumption of innocence’\(^{580}\) has also been recognised by Article 6 of the *ECHR*. An analysis of the essence of this classic Anglo-American idea of ‘the presumption of innocence’ and Article 6 of the *ECHR* demonstrate that everyone is entitled to fair treatment in all respects even if accused of an offence. The presumption of innocence principle dictates that all suspects and persons charged with a criminal offence must be treated reasonably and fairly and their rights protected like those of an innocent person, unless or until they are proved guilty by law. In the same way the DNA data of a suspect or an accused person should receive some kind of protection or fair treatment (including protection privacy of their DNA). The presumption of innocence, therefore, should apply not only to individual but also to the treatment of their DNA data. Just as ‘everyone charged with a criminal offence shall be presumed innocent’, their DNA data should be accorded the respect of that of an innocent person. This should apply to DNA data from suspects as well as those arrested and charged. This provision ceases once they are proved guilty and their DNA data — like other records, such as photos and

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\(^{575}\) *ECHR*.

\(^{576}\) Ibid art 8.

\(^{577}\) Ibid art 14.

\(^{578}\) The right to respect for private life includes the right to respect for personal autonomy, dignity, as well as privacy, and it also requires non-interference with an individual’s decision on the way to live his or her life (eg right to abortion). For further details, see Louise Terry, 'Ethical and Legal Perspective on Human Rights' in Audrey Leathard and Susan McLaren (eds), *Ethics: Contemporary Challenges in Health and Social Care* (Policy Press, 2007) 127, 135–6; Mark W Janis, Richard S Kay and Anthony W Bradley, *European Human Rights Law: Text and Materials* (Oxford University Press, 3\(^{rd}\) ed, 2008) 373–4.


\(^{580}\) *ECHR* art 6 provides: ‘everyone charged with a criminal offence shall be presumed innocent until proved guilty according to law’.
fingerprints, the retention of which in regard to convicted persons is already deemed necessary — may be retained and accessed in relation to criminal activities. The DNA material and data of innocent victims or suspects excluded from investigation, however, should not be retained and subsequently accessed. Such persons should not suffer due to the improper retention and use of their DNA data. It is, therefore, essential to manage, balance and protect these two mutually dependent but sometimes conflicting interests of society (that is, the enforcement of justice as well as protection of human rights and privacy).

The indefinite retention of the DNA samples and profiles of those who volunteer samples simply for exclusion in mass DNA forensic sampling unfairly discriminates against their entitlement to privacy and breaches their right to treatment equal to those who are also innocent of any crime (by virtue of never having been charged or arrested or a suspect). The same can be said in regard to suspects and other persons where a charge has not proved against them. Equality of treatment is the essence of Article 14 of the ECHR.\textsuperscript{581} As an example of where such a provision is breached, one only has to look to UK legislation where power has been provided to law enforcement agencies not only for the collection and retention of DNA samples and profiles from persons found guilty of an offence but also of those who are charged with an offence but not convicted.\textsuperscript{582} DNA samples and profiles can be retained under current British legislation, despite the successful appeal in the ECtHR,\textsuperscript{583} as while the Court’s rulings are to be consulted, decisions are not enforceable in the domestic jurisdictions where the matter before the Court occurred. Legislation can only be altered by the jurisdiction concerned. The UK legislation\textsuperscript{584} distinguishes unfairly between suspects or charged persons (those arrested but not convicted) and other innocent people (members of the general population who had never been

\textsuperscript{581} Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32, 549; see also ECHR art 14. It states that:

\[\text{The enjoyment of the rights and freedoms set forth in this Convention shall be secured without discrimination on any ground such as sex, race, colour, language, religion, political or other opinion, national or social origin, association with a national minority, property, birth or other status.}\]

See also \textit{S} (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [127].

\textsuperscript{582} \textit{PACE Act} s 64, as amended by \textit{CJPA} s 82. \textit{Criminal Justice Act 2003} (UK) c 44 (‘\textit{CJA}’) even allows the retention of materials supplied by minors: s 10(2). For further details see section 5.1.5.6. of Chapter 5.

\textsuperscript{583} \textit{S} (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008).

\textsuperscript{584} \textit{PACE Act} s 64 as amended by \textit{CJPA} s 82.
This kind of unequal treatment imposes a stigma on the former and creates a separate class in the society.

European Convention on Human Rights and Biomedicine

Another important EU instrument is the European Convention on Human Rights and Biomedicine which was passed in 1997 by the Council of Europe, and which protects the right to respect for the private life of an individual in terms of their health information. Although the Convention did not specifically include genetic data as health information, it should be recognised that any reference to all kinds of health information would include genetic data. Furthermore, Article 11 prohibited ‘genetic discrimination’.

EU Directive 95/46/EC on Data Protection

The EU Directive 95/46/EC on Data Protection (also known as Data Protection Directive) ‘set a milestone in the history of the protection of personal data in the European Union’. The Directive enshrines two equally important basic human rights principles — the ‘protection of fundamental rights’ and the ‘freedoms of individuals’ and in particular the fundamental right to data protection for the EU. In other words, it includes strong data and privacy protection regulations for all EU member states.

Rapid technological development and other societal changes have brought new challenges for the protection of personal data and the European Commission has in recent times felt the urgency of the need to reconsider the existing provisions on sensitive data, and to examine whether genetic data and the conditions for their

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585 Convention on Human Rights and Biomedicine.
586 Ibid art 10(1).
587 Convention on Human Rights and Biomedicine art 11. It provides that ‘any form of discrimination against a person on grounds of his or her genetic heritage is prohibited’.
590 Ibid.
processing should be added to this category.\textsuperscript{591} In the light of the acceptance of rapidly expanding social networking sites (such as Facebook) and the ‘cloud computing world’ of today, the European Union began a legislative review process in November 2010 with a Communication from the European Commission to the European Parliament and the Council entitled ‘A Comprehensive Approach on Personal Data Protection in the European Union’.\textsuperscript{592} In its 3071\textsuperscript{st} meeting dated 23–24 February 2011, the Justice and Home Affairs Council required that special attention be given to the area of biometric and genetic data from the legislative point of view recognising its extended use in many areas.\textsuperscript{593} Further, the Council of European Union noted that it is ‘of the opinion the processing of genetic data should be carried out in accordance with the principles of necessity and proportionality’.\textsuperscript{594} The Council also ‘considers that special provisions on aspects of cross-border processing should be explored’ on genetic data.\textsuperscript{595}

\textbf{(c) Soft International Laws: Norms and Guidelines}

\textit{Declarations}

More general interpretation of both international and regional instruments has provided protection for human genetic information or genetic privacy. With regards to handling human genetic information, there are a number of important and definitive international instruments, namely the \textit{International Declaration on Human Genetic Data (IDHGD)},\textsuperscript{596} the \textit{Universal Declaration on the Human Genome and Human Rights (UDHGHR)}\textsuperscript{597} and the \textit{Universal Declaration on Bioethics and

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{591} Ibid.
\item \textsuperscript{592} Andrew Hobson, ‘The EU Council’s Conclusions on Revising EU Data Protection Law — Why Did They Bother?’\textit{RPC Privacy Blog} (4 April 2011) <http://blog.rpc.co.uk/privacy-law/>.
\item \textsuperscript{594} Ibid 4 [10].
\item \textsuperscript{595} Ibid.
\item \textsuperscript{596} IDHGD, UN Doc 32C/29.
\item \textsuperscript{597} This Declaration was adopted unanimously and by acclamation at UNESCO’s 29\textsuperscript{th} General Conference by the UNESCO, 29\textsuperscript{th} sess, 29C/Res 19 (11 November 1997). The following year the United Nations General Assembly endorsed the Declaration: \textit{Universal Declaration on the Human Genome and Human Rights}, GA Res 152, UN GAOR 53\textsuperscript{rd} sess, UN Doc A/Res/53/152 (9 December 1998) (‘\textit{UDHGHR}’).  
\end{itemize}
\end{footnotesize}
*Human Rights (UDBHR)*\(^{598}\) which were adopted by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The *UDBHR* recognises that ethical issues created by the rapid scientific advances and their technological applications should be examined with due respect for human dignity, human rights and fundamental freedoms.\(^{599}\) It also urges that any kind of preventive, medical intervention and scientific research should not be carried out without prior, free and informed consent of the data subject.\(^{600}\) The *UDBHR* also states that the privacy and confidentiality of personal information of the person concerned need to be respected and such information should not be used and disclosed other than for its original purposes, and to do so would be a violation of international human rights law.\(^{601}\) Moreover, there should not be any discrimination against and stigmatisation of any individual and group in violation of human dignity, human rights and fundamental freedoms.\(^{602}\)

The *UDHGHR* and the *IDHGD* are two other significant international points of reference in the field of bioethics, the human genome and human rights.\(^{603}\) These instruments were passed in order to promote respect for human dignity irrespective of genetic characteristics, and to promote human rights and fundamental freedoms\(^{604}\) as well as to protect privacy and confidentiality,\(^{605}\) and to legislatively ban genetic discrimination.\(^{606}\) Therefore, considering privacy protection issues, these two international instruments are currently taking up the issue of protecting genetic data from unlawful and unethical uses. The main aims of the *IDHGD* are:

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\(^{598}\) *UDBHR*.

\(^{599}\) *UDBHR*, preamble; see also *UDBHR* arts 2(c), 3(1). According to these provisions, the promotion of respect for human dignity and protection of human rights and fundamental freedoms consistent with international human rights law is one of the main aims of this Declaration.

\(^{600}\) *UDBHR* art 6(1) and (2); see also the *Convention on Human Rights and Biomedicine* art 5. It says, ‘An intervention in the health field may only be carried out after the person concerned has given free and informed consent to it’.

\(^{601}\) *UDBHR* art 9.

\(^{602}\) *UDBHR* art 11.


\(^{604}\) *UDHGHR*, UN Doc A/Res/53/152, preamble [6], art 2(a).

\(^{605}\) *IDHGD*, UN Doc 32C/29, art 7; see also *UDHGHR*, UN Doc A/Res/53/152, art 7.

\(^{606}\) *IDHGD*, UN Doc 32C/29, art 14; *UDHGHR*, UN Doc A/Res/53/152, art 6; see also, *Convention on Human Rights and Biomedicine*. 124
to ensure the respect of human dignity and protection of human rights and fundamental freedoms in the collection, processing, use and storage of human genetic data, … and of the biological samples … in keeping with the requirements of equality, justice and solidarity, … 607

The IDHGD recognises the special status of human genetic data and makes provision with regard to the collection, processing, use and storage of human genetic data for the purposes of diagnosis, health care and other scientific research. 609 Article 7 also declares that effort should be made to ensure that human genetic data should not be used to discriminate and stigmatise any individual, family, group or communities in a way that might infringe their human rights, fundamental freedoms or human dignity. 610 The Declaration also requires that prior, free, informed and express consent should be obtained for the collection of human genetic data or biological samples 611 and that the necessary measures be taken to ensure the accuracy, reliability, quality and security of these data. 612

Similarly, Article 5 of the UDHGHR also states almost the same principle. It provides that research affecting an individual’s genome be undertaken only after obtaining the prior, free and informed consent of the person concerned. Additionally, the IDHGD has required that human genetic data or the biological samples collected from a suspect in the course of criminal case investigation to be destroyed after the purpose of the forensic investigation is completed and/or any relevant civil proceedings ended, unless otherwise provided by the domestic law. 613 It also provides extensive guidelines for the international community regarding the collection, use, processing, access and storage of human genetic data and the promotion and implementation of the Declaration. 614

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607 IDHGD, UN Doc 32C/29, art1.
608 Ibid art 4.
609 Ibid art 5. However, it does not include the collection and processing of data in the investigation, detection, and prosecution of criminal offences and in parentage testing, for further details see art 1(c).
610 IDHGD, UN Doc 32C/29.
611 Ibid arts 8, 9.
612 Ibid art 15.
613 Ibid art 21.
614 Ibid arts 8–24.
The necessity of setting universal ethical guidelines covering all issues in the field of bioethics is felt throughout the world. Being aware of the complexity and scale of research in genetics and also realising the urgent need for international guidelines, UNESCO’s Director-General asked the International Bio-ethics Committee (IBC) to examine the possibility of drafting international instruments in the field of bioethics, human genome and human rights. In this context and based on preliminary feasibility studies by the IBC, UNESCO was mandated by its Member States to draw up international instruments setting out fundamental principles in the field of bioethics, human genome and human rights. Consequently over the years, UNESCO has confirmed its standard-setting role in bioethics with the successful adoption of these international instruments in bioethics.

Resolutions

Another international approach that deals with the same issue is promoted by the United Nations Economic and Social Council (ECOSOC), which considered concerns related to genetic material and information at its 2001, 2004 and 2006.

615 UNESCO’s ethics programme started in 1993 with the establishment of the International Bioethics Committee (IBC), a statutory body of UNESCO. See also, Division of Ethics of Science and Technology Sector for Social and Human Sciences UNESCO, ‘Ethics of Science and Technology at UNESCO’ (SHS/EST/GEOBS/2008/PI/1, United Nations Economic, Social and Cultural Organisation (UNESCO), 2008) <http://unesdoc.unesco.org/images/0016/001600/160021e.pdf>.


617 Henk Ten Have observes:

The ethics program of UNESCO has started in the early 1990s with the request of the Member States to develop global ethical standards in regard to the Human Genome Project. The International Bioethics Committee (IBC) composed of 36 independent experts from all regions has been established in 1993 in order to advise the Director-General in ethical matters. The IBC drafted the Universal Declaration on the Human Genome and Human Rights that was adopted by the Member States of UNESCO in 1997 and by the United Nations in 1998. This Declaration was followed by a more specific request relating to the collection, processing, use and storage of human genetic data. The International Declaration on Human Genetic Data has been adopted in 2003. Subsequently, a much broader mandate was given in order to identify universal bioethics principles in general. This resulted in the Universal Declaration on Bioethics and Human Rights, unanimously adopted in 2005. This last Declaration is the first global statement in the area of bioethics to which governments have committed themselves.


618 Division of Ethics of Science and Technology Sector for Social and Human Sciences UNESCO, above n 615.


2007\textsuperscript{621} plenary meetings. In the resolutions of 2001 (2001/39)\textsuperscript{622} and 2004 (2004/9),\textsuperscript{623} states are urged to ensure that no one is subjected to discrimination based on genetic information. Resolution 2004/9 also calls upon states to take appropriate specific measures to prevent the misuse of genetic information leading to discrimination against individuals, members of their families or groups in all areas of life.\textsuperscript{624} It further calls upon states to promote the development and implementation of standards providing appropriate protection with regard to the collection, storage, disclosure and use of genetic information that might lead to discrimination, stigmatisation or invasion of privacy.\textsuperscript{625} Moreover, ECOSOC decision 2008/233 urges the implementation of resolutions 2001/39 and 2004/9 and other declarations protecting genetic privacy and non-discrimination.\textsuperscript{626}

The only point of reference for the use of DNA profiling in the justice delivery system is the United Nation General Assembly (UNGA) resolution no 8 recognising the efficiency of DNA profiling as a powerful tool for criminal investigations, a resolution adopted by UNGA in 1998.\textsuperscript{627} Following the acceptance of the resolution 8, and in order to advance international co-operation on the use of DNA in criminal investigations, INTERPOL established its DNA Unit. Its objective is ‘to provide strategic and technical support to enhance member states’ DNA profiling capacity and to promote [its] widespread use in the international law enforcement environment’.\textsuperscript{628}

This study has selected a few prominent common law jurisdictions for closer examination, and the following section is going to examine national legislation from these jurisdictions in regard to protecting human rights and privacy in general, and in forensic context in particular.

\textsuperscript{621} Genetic Privacy and Non-discrimination, ECOSOC Decision 2007/269, 47\textsuperscript{th} mtg (27 July 2007).
\textsuperscript{622} Genetic Privacy and Non-discrimination, ECOSOC Resolution 2001/39, resolution (1).
\textsuperscript{623} Genetic Privacy and Non-discrimination, ECOSOC Resolution 2004/9, resolution (3).
\textsuperscript{624} Ibid resolution (5).
\textsuperscript{625} Ibid resolution (6).
\textsuperscript{626} Genetic Privacy and Non-discrimination, ECOSOC Decision 2008/233, 39\textsuperscript{th} mtg, Agenda Item 14(i) (22 July 2008) decision (a). See also Genetic Privacy and Non-discrimination, ECOSOC Resolution 2001/39.
\textsuperscript{628} Interpol, DNA Profiling (5 July 2011) <http://www.interpol.int/public/forensic/dna/default.asp>.
3.1.3.3 National Legislations

Several governments have framed different national legislation protecting genetic privacy. Some of the prominent national (and other) privacy protection legislation — including the laws of the US, the UK, and Australia — are now considered in turn.

(a) The US

Privacy is a complex concept involving different but overlapping personal interests. There is no comprehensive federal law for protecting the privacy of medical information generally and genetic information particularly. Instead ‘there is a patchwork of federal and state laws that extend protections to health information based on the type of entity that collects or creates the information.’629 Moreover, in the US there is no single law protecting all of personal interests. The aggregate of privacy protections are found in the US Constitution, statutes, regulations and in common law. There are different rights and duties regarding personal information in the US depending upon the kind of information involved. Therefore, privacy laws in the US are fragmented because of the multiple sources of law, including the federal government and all 50 states. In the view of Roche and Annas:

Legislative enactments are ... the result of negotiated agreements among segments of a diverse and often polarised society, rather than of a real consensus.630

It is also evident that the HGP ‘has created a high resolution picture of human genome’631 and provided vast and multi-faceted opportunities for the scientists and the researchers while also prompting questions regarding ownership, intellectual property and privacy rights issues, among others. The HGP has thus influenced the formation of US policy and the ethical, legal and social implications of the program have further prompted several legislative initiatives632 in this area. Federally, a number of initiatives have been taken to provide protection for genetic privacy. Several laws have been enacted during the last decade seeking to regulate genetic

629 Joanne L Hustead, Aimee Cunningham and Janlori Goldman, 'Genetic Privacy: A Patchwork of Protections' (California Health Care Foundation, April 2002) 12.
630 Roche and Annas, above n 439.
632 Tony, above n 413, 225; see also Roche, Glantz and Annas, ‘A Proposal for National Legislation’, above 479, 4; Annas, Glantz and Roche, ‘The Genetic Privacy Act and Commentary’, above n 479.
privacy, including the Genetic Privacy Act (Bill) of 1995. The Genetic Privacy Bill intends to protect and guarantee individual privacy for subjects of DNA testing. The Bill provides for the requirement of informed consent for the collection, analysis, and disclosure of DNA information, a requirement that DNA samples must be destroyed when analysis has been completed. Anyone who holds private genetic information in the ordinary course of business must keep such information confidential and is prohibited from disclosing it unless the disclosure has been authorised in writing by the sample source or sample source’s representative. Collection and analysis of DNA without prior authorisation is permissible only for law enforcement identification activities and identification for dead bodies or otherwise authorised by law such as court order. This said proposed Bill was one of the comprehensive federal initiatives for genetic privacy protection; however, finally it has not been enacted.

The legal implications of genetic information in regard to health insurance issues were addressed by Congress in the Health Insurance Portability and Accountability Act (HIPAA) of 1996. The Act ‘is the first federal law to specifically address discrimination and insurance issues’ relating to genetic information. The HIPAA privacy regulation took effect in April 2001 and it ‘required the federal government to implement a privacy law that covered health information created or received by private health care providers and health plans’. With regards to genetic


634 GPA Bill 1995 § 2(a) (8).


636 GPA Bill 1995 § 111 and 112; see also Annas, Glantz and Roche, ‘The Genetic Privacy Act and Commentary’, above n 479; Roche, Glantz and Annas, ‘A Proposal for National Legislation’, above 479, 4–5, 8–9; Annas, Glantz and Roche, ‘Drafting the Genetic Privacy Act’, above n 635, 361.


640 Hustead, Cunningham and Goldman, above n 629; see also Hustead and Goldman, above n 467, 289.
information, the HIPAA provides that ‘genetic information ... be protected by this regulation as long as it meets the definition of protected health information’ (PHI). However, the definition of PHI does not explicitly refer or include genetic information. To fill the gap, the US Department of Health and Human Services (DHHS) included in a definition in its ‘Standards for Privacy of Individually Identifiable Health Information’, whereby PHI ‘includes genetic information that otherwise meets the statutory definition’. This definition includes genetic tests, services, or counselling, as well as an individual’s family medical history.

Nevertheless there remain some gaps in the HIPAA with regards to the protection of genetic information. One of the primary drawbacks of this regulation is its limited scope. It does not directly regulate many key entities that obtain and use health information, such as pharmaceutical companies, workers’ compensation insurers, employers and many researchers. It has been observed that the Act ‘only indirectly reaches some of the entities to which a regulated entity is permitted to disclose the information’. Moreover the HIPAA privacy regulation does not protect tissue, blood, or any other bodily source of a person’s genetic information, despite a person’s genetic sample being relatively easy to obtain. In addition, web based genetic information is vulnerable, where genetic information is collected, used and disclosed in an unprotected way. Finally, it can be argued that the application of the HIPAA for protecting genetic information depends on the fulfilment of many criteria and conditions and it failed to provide adequate protection for genetic privacy.

The most recent federal law protecting genetic information is the Genetic Information Non-discrimination Act (GINA) of 2008 and it is a US Act of

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641 Hustead and Goldman, above n 467, 289.
642 Protected Health Information (PHI) is defined broadly and includes information about the past, present or future physical or mental health or condition of an individual, the provision of health care to an individual or the past, present or future payment for the provision of health care to an individual, for further details see 45 Code of Federal Regulations (CFR) § 164.501; Hustead and Goldman, above n 467, 289.
644 Hustead, Cunningham and Goldman, above n 629, 14.
645 Ibid 12, 27.
646 Hustead, Cunningham and Goldman, above n 629, 27.
647 Ibid 28.
Congress 648 passed in order to protect citizens against discrimination based on their genetic information with regards to health insurance and employment. 649 Title I of the said Act prohibits group health plans and health insurers from denying coverage to a healthy individual or charging that person higher premiums based solely on a genetic predisposition to developing a disease in the future. 650 Amending various existing laws, it also provides limitations on genetic testing as well as prohibiting the collection of genetic information for the purpose of health insurance coverage. 651 Moreover, it protects privacy and confidentiality. Section 105 provides that health information (that is, genetic information about an individual for underwriting purposes under the group health plan, health insurance coverage, or Medicare supplemental policy) shall not be a permitted use or disclosure. 652 In addition, Title II of GINA prohibits the use of genetic information in making decisions related to any terms, conditions, or privileges of employment, prohibits covered entities from intentionally acquiring genetic information, by employers, employment agencies, labour organisations and joint labour-management training programs. 653 It also requires confidentiality with respect to genetic information (with limited exceptions). 654 Thus Title II of GINA prohibits discrimination based on genetic information.

Furthermore, in 2000 an Executive Order 655 (namely, Executive Order 13145 of 2000) 656 by President Clinton barred the federal government from discriminatory use of genetic information in hiring and employment practices. 657 The then US

649 Genetic Information Non-discrimination Act preamble.
651 Ibid §§ 102–104.
653 Ibid §§ 201–205.
654 Ibid § 206.
655 An Executive Order is a specific power of the US president and the executive branch. Such power is provided by Section 1, Article II of the US Constitution. This power provides the president with the authority to create laws or determine how existing laws should be carried out. Through these orders, the President manages the operations of the Federal Government. Executive Orders are legally binding orders for the Federal Administrative Agencies.
656 Executive Order 13145.

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Government adopted this policy, providing strong privacy protections to any genetic information used for medical treatment and research.

At present the majority of state legislatures\textsuperscript{658} have taken steps to safeguard genetic information beyond the protections provided for other types of health information. State genetic privacy laws typically restrict any or certain parties (such as insurers or employers) from carrying out a particular action without consent. Laws in 17 states require informed consent for a third party either to perform or require a genetic test or to obtain genetic information. Some 27 states require consent to disclose genetic information; while 4 states mandate individual access to personal genetic information, and 19 states have established specific penalties — civil, criminal or both — for violating genetic privacy laws.\textsuperscript{659} Many states have passed laws that protect the privacy of genetic information, but, like the federal regulation, the approach is often sector-specific.\textsuperscript{660} Moreover, ‘the definition of genetic information in these laws also varies considerably’.\textsuperscript{661}

In this regard, it can be argued that the US has not established a coherent or comprehensive policy and/or federal law about how US society should view or handle their genetic information.\textsuperscript{662} US federal legislation, such as \textit{GINA 2008}, has protected only a particular segment of genetic information, such that it prohibits US insurance companies and employers from discriminating against employees on the basis of information derived from genetic tests. Likewise \textit{Executive Order 13145} provides privacy protections to any genetic information but only when used for medical treatment and research, and there is no provision to protect genetic privacy in context of forensic use of DNA data. Furthermore, states have a patchwork of genetic-information non-discrimination laws, none of them is comprehensive. In addition, existing state laws ‘differ in coverage, protections afforded, and

\footnotesize{\textsuperscript{658} National Conference of State Legislatures, \textit{Genetic Privacy Laws} (2008) \texttt{<http://www.ncsl.org/IssuesResearch/Health/GeneticPrivacyLaws/tabid/14287/Default.aspx>}. However, Washington is the only state that explicitly treats genetic information the same as other health information by including genetic information in the definition of health care information under the State’s health privacy law.\textsuperscript{659} Ibid.\textsuperscript{660} Hustead and Goldman, above n 467, 288.\textsuperscript{661} Sankar, above n 483, 395.\textsuperscript{662} Hustead and Goldman, above n 467, 287.}
enforcement schemes. Their coverage is also confined only to medical treatment, research and employment without protecting human rights and genetic privacy in the context of the forensic use of DNA data.

(b) The UK

English common law ‘has. famously, never recognised a general right to privacy’, although it provides remedies for ‘breach of confidence’. The common law obligation in regard to confidentiality indirectly protects a person’s right to individual privacy. As a result, prior to the passing of the Human Rights Act (HRA) 1998, there was ‘an incomplete scheme of privacy protection’ under the UK law. The passing of the HRA, however, provides only ‘limited incorporation of the European Convention on Human Rights (ECHR) into domestic law, including the right of privacy’. The major legal mechanism protecting privacy in the UK is the EU Directive 95/46/EC on Data Protection and the implementing national law, the Data Protection Act (DPA) 1998. According to the nature of the biological samples and/or genetic information, these should fall within the scope of EU Directive 95/46/EC. In this regard, the Article 29 Data Protection Working Party stated that ‘[t]here is no doubt that genetic information content is covered by the definition of personal data contained in Directive 95/46/EC’. However the

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663 Genomics.energy.gov, Genetics Privacy and Legislation (16 September 2008). For further details see also National Conference of State Legislatures, above n 655.
666 Human Rights Act 1998 (UK) c 42 (‘HRA’).
Working Party ‘considered that there are circumstances in which genetic information is clearly personal data and that there are circumstances in which it is not so clear. Context is all important’.\(^{672}\) Therefore to what extent, and whether or not the definition of personal data of this directive includes genetic information is controversial.\(^{673}\) Nevertheless, it is here argued that the handling of genetic samples or information derived from those samples, which comprise inherently sensitive personal data, should meet the standards set by the \textit{DPA} principles of fairness and lawfulness.

Although genetic information is not explicitly protected as personal data under the UK \textit{DPA}, the broader interpretation of some of its provisions provides protection for genetic information as sensitive as well as personal data.\(^{674}\) Since genetic information is unique and there is a possibility that it might reveal individual’s health data and other factors (such as, ethnicity), such information falls under the purview of ‘sensitive personal data’.\(^{675}\) This applies where DNA is collected for any purpose (including criminal case investigation) and as ‘sensitive personal data’, such material also requires a higher degree of protection.\(^{676}\) The processing of personal sensitive data should be defined under this Act to include ‘obtaining genetic data’. The Act stipulates the conditions that must be met for the processing of sensitive data, particularly in regard to obtaining the consent of the data subject.\(^{677}\) Finally it can be argued that the UK \textit{DPA} sets out eight ‘data protection principles’\(^{678}\) which reflect in essence the ‘data protection principles’ of \textit{Directive 95/46/EC} in regard to the protection of personal data of any individual. Obligations are thereby imposed on everyone who associated with the collection, processing and use of genetic information in the UK.\(^{679}\)

\textbf{(c) Australia}


\(^{673}\) Ibid 177.

\(^{674}\) \textit{Data Protection Act 1998} (UK) c 29, ss 1, 2 (‘\textit{DPA}’).

\(^{675}\) \textit{DPA} s 2.


\(^{677}\) \textit{DPA} sch 1 and 2, pt 1.

\(^{678}\) Ibid s 4 and sch 1.

\(^{679}\) Shafran, above n 669, 61–2; see also Harrop and Atton, above n 676, 240.
There are some statutory protections dealing with issues of privacy and genetic privacy at different levels. At the federal level, the most important legislation is the *Privacy Act 1988* (Cth). The 1988 Act contains two privacy principles: *Information Privacy Principles* (IPP) applicable for the public sector and the *National Privacy Principles* (NPP) applicable for the private sector. The said Act and principles regulate the disclosure of personal information. The recent ‘genetic revolution’, where huge quantities of genetic material and samples and information derived from such samples have become available has raised various ethical as well as legal concerns, and requires greater protection of genetic information. However, initially neither the *Privacy Act 1988* nor its related *Principles* provided protection of genetic information.

Recognising the significance of genetic privacy, in 1998 then Senator Natasha Stott Despoja introduced the Genetic Privacy and Non-Discrimination Bill to the Australian federal parliament in a bid to afford protection to the genetic privacy of individuals and make genetic discrimination unlawful; however, the Bill was not passed by the Australian Parliament. Instead, the Australian Law Reform Commission was later asked to conduct an inquiry. After an enquiry lasting two years, the ALRC published its report in 2003 on the protection of human genetic information addressing the issues of genetic privacy and so on. In this report, the ALRC recommended a number of changes to the existing national legislation to

680 *Privacy Act* preamble.
681 *Privacy Act* pt III div 2; see also Australian Law Reform Commission, *For Your Information: Australian Privacy Law and Practice*, Report No 108, vol 1, 638 [Recom 18.2]. It proposes that the *Privacy Act 1988* should be amended to consolidate the current ‘Information Privacy Principles’ and ‘National Privacy Principles’ into a single set of privacy principles, referred to in this Report as the model ‘Unified Privacy Principles’ (UPP).
682 *Privacy Act* sch 3.
683 *Privacy Act* pt III div 2 s 14 principle 15 and sch 3.
686 The Attorney-General of Australia and the Minister for Health and Aged Care asked the ALRC and the AHEC of the National Health and Medical Research Council (NHMRC) to conduct that inquiry.
688 In its List of Recommendations: Part B. Regulatory Framework, the following relevant recommendations were made under ‘7. Information and Health Privacy Law’: Recommendation 7–4 ‘The Commonwealth should amend s 6 of the *Privacy Act 1988* (Cth) (*Privacy Act*) to define health information’ to include genetic information about an individual in a form which is or could be
protect the privacy of human genetic samples and information. In particular, it recommended amending the definition of ‘health information and sensitive information’ in the Privacy Act and its related Principles to include genetic information.

Following the ALRC’s recommendation, the Commonwealth Government amended the existing privacy legislation to extend the coverage of the privacy principles to identifiable genetic samples.689 The definition of ‘health information’ and ‘sensitive information’ in the Privacy Act was amended to expressly include genetic information.690 The amendment also includes the amendment of the NPPs.691 It also provides that disclosure of genetic information to genetic relatives must be conducted in accordance with guidelines to be issued by the National Health and Medical Research Council (NHMRC) and approved by the Privacy Commissioner.692 The aim of this legislation is to prohibit disclosure of personal information without the person’s consent. Similar principles are also contained within relevant state and territory legislation.693

The following section will analyse relevant privacy protection legislation of Bangladesh (representing the developing country). Bangladesh is one of the selected case studies for this research. An analysis of the relevant national legislation will help the author to comprehend the existing privacy protection legislative scenario in Bangladesh.

(d) Bangladesh

The ‘right to privacy’ is a fundamental right and this right is ensured by the supreme law of Bangladesh — the Constitution of the People’s Republic of Bangladesh694 —

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689 Alston, above n 557, 435.
690 Privacy Legislation Amendment Act See also section 2.1.2.4 (a) of Chapter 2.
691 Privacy Act Sch 3 — National Privacy Principle 2.1(ea), pt IX s 95AA.
692 Privacy Act s 95AA.
693 Health Records Act 2001(Vic); Health Records and Information Privacy Act 2002 (NSW).
694 Constitution of the People’s Republic of Bangladesh, 1972 (as amended up to 2011) (‘Constitution of Bangladesh’).
which provides privacy protection with regards to ‘home and correspondence’.

But this fundamental right is not absolute; rather this privacy right is ‘subject to some reasonable restrictions imposed by law in the interests of the security of the state, public order, public morality or public health’. These considerations as outlined in law may qualify that right to privacy.

Supplementing the Constitutional right to privacy there are some statutory laws that provide protection for the right to privacy, such as the Information and Communication Technology Act 2006, which bars the disclosure of information deemed confidential and private with regard to electronic record, book, register, correspondence, information, document or other material of any individual without their consent.

The Evidence Act 1872 provides protection for confidentiality of communications within fiduciary relationships, such as, in ‘professional communication’ and ‘confidential communications with legal advisers’. These provisions are also subject to some restrictions. This section, for instance, will not protect disclosure of any such communication that is made in furtherance of any illegal purpose. Similarly, the said law deals with confidentiality between client and legal adviser.

Moreover, confidentiality between patients and doctors, what many see as encompassing a patient’s right to privacy, has also been acknowledged by the ‘Code of Medical Ethics’ framed under the authority of the Bangladesh Medical and Dental Council Act. Guideline 4(b) of that Code prohibits disclosure of any information collected in confidence from any patients by the medical or dental practitioners, but

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695 According to the fundamental law of Bangladesh, ‘every citizen shall have the right:
   a. to be secure in his home against entry, search and seizure; and
   b. to the privacy of his correspondence and other means of communication’

696 Ibid.

697 Section 78: any person who has secured access to any electronic record, book, register, correspondence, information, document or other material shall not disclose such electronic record, book, register, correspondence, information, document or other material to any other person, without the consent of the person concerned,

698 Evidence Act, 1872 (Act No I of 1872) s 126 (‘Evidence Act’).

699 Ibid s 129.

700 Ibid.

701 Bangladesh Medical and Dental Council Act (Act No XVI of 1980).
such right is exercised subject to the law in relation to state security. These laws (the Evidence Act 1872 and the Bangladesh Medical and Dental Council Act) provide protection particularly for confidentiality (one of the aspects of privacy) rather than privacy per se.

Further, a customer’s right to privacy during telecommunication has been protected by the Bangladesh Telecommunication Act 2001. Under this Act one of the functions of the Bangladesh Telecommunication Regulatory Commission (BTRC) is to ensure protection of privacy of the customers during telecommunication. Again, the Money Laundering Prevention Act 2009 prohibits unauthorised use, disclosure or ‘leak’ of any information which has been collected, obtained or become known to a person or organisation or agent appointed under this Act and such prohibition exists not only during and also after the term of service of that person or organisation or agent. Therefore it can be argued that ‘right to privacy’ is an established, fundamental and statutory right for all citizens of Bangladesh.

The individual’s ‘right to privacy’ is protected and ensured under Bangladeshi constitutional and statutory laws as regards almost every kind of communication (home, correspondence, electronic records, financial communications, telecommunications, confidential communication between doctors and lawyers and their clients, and so on). However, genetic privacy has not been protected under any of this legislation. The use of DNA information for forensic purposes began in Bangladesh very recently (2006); however, up until the present time neither the idea of protecting genetic information nor of a right to genetic privacy has attracted the attention of citizens or the policy makers of Bangladesh. The lack of adequate and effective regulation may lead to human rights and privacy violation with far reaching consequences. The problem can be more serious when it comes to genetic violation in the delivery justice system (like the Marper case). The examination of Bangladeshi legislation has identified that genetic privacy is not protected adequately, especially in the context of forensic use of DNA information. It can also

702 For further details see section 3.1.2.3(a) of this Chapter.
703 Bangladesh Telecommunication Act (Act No 18 of 2001).
704 Ibid s 30(1)(f).
705 Money Laundering Prevention Act (Act No 8 of 2009) s 6(2).
be argued that DNA technology has advanced far and been adopted rapidly around the world. In such circumstances, the lack of an appropriate mechanism for protecting genetic privacy in the Bangladeshi jurisdiction is detrimental to social harmony, justice and economic growth and also in other developing countries. The ethical, social and economic development of Bangladesh is facing substantial challenges.

Bangladesh is not alone in this struggle to anticipate or even keep the law abreast of technological change, particularly in this area. The legal framework for considering issues related to the genetic material and information lags far behind the advances in genetic science. The rapid development of science and its technological applications, therefore, demands urgent and profound national and international actions.

3.1.3.4 Assessing the Adequacy of Legal Protection of Human Rights and Genetic Privacy

A number of international as well as regional instruments, resolutions and guidelines reflect a concern for the proper use of and access to human genetic data and the need to ensure the protection of human rights, and the individual’s right to privacy. They also encompass recognition of the need to ensure non-discrimination on the basis of genetic information. Although these instruments are non-binding, their value and strength (it is argued) are in no way diminished. These initiatives demonstrate the growing commitment of international community to introduce and respect some basic principles regarding bioethics and human genome.

The UDHR, ICCPR and ICESCR are some significant international instruments protecting and preserving human rights. These instruments highlight respect for and observance of human dignity, human rights and fundamental freedoms.706 In general these instruments provide protection for the right to privacy. However, they have apparently failed to provide adequate privacy protection for the data subject while collecting, retaining and accessing to his genetic samples and information by others.

706 UDHR, UN Doc A/810; ICCPR; ICESCR preamble.
At the regional level, it is assumed that the *European Convention for the Protection of Human Rights and Fundamental Freedoms (ECHR)*\(^{707}\) has provided adequate protection for the right to privacy.\(^{708}\) However, the idea of ‘adequacy’ is hard to determine specially, when a member state has failed to implement regionally agreed rules or norms within their national jurisdiction. For instance, in 2008, the European Court of Human Rights (ECtHR) ruled that there had been a violation of Article 8 of the *ECHR* through the indiscriminate retention of DNA samples and profiles.\(^{709}\) Nevertheless DNA samples and profiles can be retained under current British legislation. It can be argued that although the ECtHR court ruling can be consulted, decisions are not enforceable in the UK jurisdiction. Legislation can only be altered by the jurisdiction concerned, in this case by the UK.

Further, *EU Directive 95/46/EC on Data Protection* includes strong data and privacy protection regulations for all EU member states. In this regard Graham Greenleaf argued that because of the ‘adequacy’ mechanism, the influence of European data privacy standards has been felt outside Europe.\(^{710}\) He also added that:

> It is a plausible (and in my view, correct) hypothesis that the EU Directive is the most significant overall influence on the content of data privacy laws outside Europe, and that its influence is gradually strengthening, partly because of the desire of non-EU countries to have their laws recognised as ‘adequate’, but also because of the their aspiration that their laws should be recognised as providing the highest international standard of privacy protection.\(^{711}\)

One of the shortcomings of this Directive is that it requires EU member states to protect the privacy of personal data;\(^{712}\) however, it says nothing explicitly about medical research,\(^{713}\) nor is genetic data explicitly mentioned as a sensitive category of data.\(^{714}\) Another dilemma is that these instruments are regionally bindings for a particular region (for example, the EU), they have little impact for rest of the world.

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\(^{707}\) *ECHR*.

\(^{708}\) Ibid art 8.

\(^{709}\) *S*(Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008).


\(^{711}\) Do not dismiss ‘adequacy’: European data privacy standards are entrenched, *Graham Greenleaf, Privacy Laws & Business International Report*, Issue 114, December 2011, 16, 17.

\(^{712}\) *EU Directive 95/46/EC on Data Protection* [1995] OJ L 281/31, arts 1, 2(a), 6, 8(1).


Meeting required special attention to be given for introducing legal protection of genetic data. However, it is not clearly mentioned by the council why genetic data should get this special treatment. In regard to the interface of law enforcement and judicial operations and data protection, the Council noted that:

the notion of a comprehensive approach to data protection does not necessarily exclude specific rules for data protection for police and judicial cooperation in criminal matters within this comprehensive protection scheme ... the Commission [is encouraged] to propose a new legal framework taking due account of the specificities of this area ...  

The Council comments specifically on the need for harmony and balance in regard to the competing rights of individuals and society:

[C]ertain limitations have to be set regarding the rights of individuals in the specific context in a harmonised and balanced way, when necessary and proportionate and taking into account the legitimate goals pursued by law enforcement authorities in combating crime and maintaining public security.  

Further, International Declaration on Human Genetic Data (IDHGD), the Universal Declaration on the Human Genome and Human Rights (UDHGHR) and the Universal Declaration on Bioethics and Human Rights (UDBHR) - these are some declarations which provide provision to protect genetic data. Two of these declarations also contain provision protecting privacy and confidentiality of genetic data. The privacy and human rights issues in the context of scientific and medical research on the human genome or genetic information have been addressed by the UDBHR and the UDHGHR. In a strict sense these declarations did not address the ethical issues which could be raised in the context of forensic use of genetic information; however, a general interpretation of the texts with regard to scientific research should include an analysis of human DNA for the purpose of forensic use of DNA profiling. On the other hand, the IDHGD expressly bars the application of its provisions to the field of forensic medicine, civil, criminal and other legal proceedings (that is, investigation, detection and prosecution of criminal offences, parentage testing). Therefore, the aim and scope of this last declaration did not

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715 Ibid 4 [4].
716 Ibid.
717 UDBHR, preamble. It notes that the UDBHR urges a timely declaration and adoption of universal principles which will provide a foundation for the resolution of the ever-increasing dilemmas and controversies that science and technology present for humankind.
provide provision for the protection of privacy and human rights in the context of forensic use of DNA information.

Moreover, these declarations are not legally binding instruments but, according to a UNESCO statement, they were chosen instead of a convention so as ‘to facilitate consensus and allow for adaptations in a domain where the variety of situations covered, and the complexity of the subject, is constantly evolving with new scientific discoveries’. Although these declarations constitute non-binding instruments in international law, the unanimous adoption by member states is not merely symbolic but gives the declaration moral authority. It signals a moral commitment by members that imposes a corresponding moral obligation upon members. In addition, these declarations remind the international community of its duty of solidarity towards all countries. As a result, for the first time in the history of bioethics, all signatory states of the international community are solemnly committed to respect and implement the basic principles of bioethics.

Furthermore, with regard to the issue of privacy protection of forensic use of DNA data, it can be argued that a more stringent legal instrument in the form of treaty or convention binding the state parties is essential for guiding the use of DNA profiling in the justice delivery system, in the same spirit as UNGA resolution 8 which clearly recognises the power of the technology. For this reason it is justified to argue that the legal protection for genetic privacy while conducting criminal case investigation is inadequate.

It can also be argued that most of the international declarations, resolutions, normative texts and statements are ‘soft’ international laws and they have limited legal enforceability. They are inadequate in providing protection for genetic privacy and in most cases their enforcement for compliance is very limited in national jurisdictions. The languages in some of the instruments specify which sections are not obligatory for the signatory states. Even if certain matters appear obligatory, it is the force of moral pressure, not sanctions, that are the method applied to encourage

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719 Ang, above n 616; see also Have, above n 617.
(rather than enforce) compliance. Moreover, at present there is also no distinctive, comprehensive and adequate international legislative instrument to guide the collection, analysis, storage of human DNA samples and profiles in order to protect human rights. Besides, there is no instrument that specifically protects the use and retention of DNA samples and profiles for law enforcement purposes.

In absence of a specific international instrument, statutory frameworks regulate collection, retention and use of bodily samples taken from individuals in the course of criminal investigations, and prosecutions rests on national legislation,\(^{720}\) which vary between jurisdictions. For instance, in case of USA, like federal regulation, the state legislative approach protecting the privacy of genetic information is sector specific and differs in coverage, protection and enforcement schemes. This coverage is confined only to medical treatment, research and employment and it did not extent to genetic privacy protection. Besides, the definition of genetic information also varies in these laws. Further, limited incorporation of the *ECHR* has been provided into UK domestic law, including the right of privacy’.\(^{721}\)

Analysis of the initiatives taken by some developed countries (UK, USA and Australia)\(^{722}\) in the previous section suggests that these countries have either enacted new legislation or amended existing ones to protect human genetic information. However, there is no such legislation to protect genetic privacy in Bangladesh. Therefore it is very important to recognise ‘right to genetic privacy’ in Bangladesh, which may be accomplished through some guidelines, national policy and/or legislation.

From the above discussion it is evident that the precise nature of privacy protection, more particularly genetic privacy, and necessity of protection of such type of privacy varies considerably across the world. Consequently, access to and use of DNA information or genetic data is regulated separately throughout the world. Moreover there are inconsistencies in national legislations that regulate genetic privacy. These inconsistencies are creating complexities and uncertainty. International cooperation

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\(^{720}\) Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32, 547.


\(^{722}\) Section 3.1.3.3 of this Chapter.
faces various challenges due to these inconsistencies in national legislations. In this regard Mark Taylor highlighted that:

> Without constructing a coherent world-view, acceptable by all as representative of the correct values in the correct measure, how might one assess the appropriateness of a legal framework designed to protect certain preferences regarding access to, and use of, genetic data?

With regard to the assessment of the appropriateness of the legal framework, she further suggested that:

> [T]he first step towards a realistic assessment of the appropriateness of any legal framework, intended to protect privacy, must be to consider whether it is capable of even accounting for particular patterns and preferences. These patterns and preferences regarding access to genetic data I call ‘norms of exclusivity’. ... Next, one might consider whether, if protection was to be effective, the protection identified as appropriate could be delivered in practice. ...

After analysing the view of Mark Taylor, it can be argued that based on the above mentioned test most of the international instruments and national legislations have apparently failed to provide an appropriate definition of ‘genetic privacy’ or what is meant by privacy of genetic information. Without adopting a globally consistent acceptable definition of genetic privacy, it is difficult to assess the adequacy of its legal protection. In this regard Mark Taylor further pointed out that:

> ... [I]n many cases, the existing legal framework can be critiqued according to its inability to take even the first step towards adequate privacy protection: the concept of ‘personal data’ is incapable of accounting for the norms of exclusivity regarding research use of genetic data.

Finally it can be argued that the legal protections which are available worldwide are inadequate for protecting privacy of genetic information, partly because of non-coherence between and among the international community, and partly because countries could not agree to adopt a universally acceptable legal instrument to address these issues.

There are countries whose protection of genetic privacy, and particularly whose judicial analysis and decisions relating to that protection, are worth examining. The case law of such countries provides an excellent example for legislative and judicial principles in this field, both for health care and forensic use. The main focus of this discussion is to assess the implications of the judicial decisions below in ensuring genetic privacy protection, particularly in the context of forensic use of DNA data in the investigative process.
3.1.3.5 Case-law

(a) S and Marper v United Kingdom

The case of *S and Marper v United Kingdom* is a recent landmark decision as a judicial recognition of human rights and privacy in the justice delivery system. Though it is a general understanding that the use of DNA profiling for the forensic purposes do not reveal personal health information, therefore, it does not violate human rights and privacy. However, for the first time by this case it has been recognised that retention of DNA samples is a substantial threat to privacy.

Facts of the Case

Both the applicants of this case, Mr S and Mr Michael Marper are British nationals. They were born in 1989 and 1963 respectively and live in Sheffield (UK). On 19 January 2001, Mr S (the first applicant) was arrested (while aged 11) and charged with attempted robbery. His fingerprints and DNA samples were taken by the British police. Since his charge was not proved, he was acquitted on 14 June 2001. On 13 March 2001, Mr Michael Marper (the second applicant) was arrested and a charge laid against him of harassment of his partner. His fingerprints and DNA samples were also taken. On 14 June 2001, the charge against him was formally discontinued as he and his partner had reconciled. As the charges had been dismissed and the proceedings terminated, both applicants requested the destruction of their fingerprints and DNA samples in the database, but in both cases the Chief Constable of South Yorkshire Police refused to destroy the materials as the retention of their DNA data for unlimited period of time is authorised by the UK domestic law. Both applicants applied for a judicial review of the police decision. On 22 March 2002, the Administrative Court of UK rejected their application. The Court of Appeal then upheld the decision of the Administrative Court on 12 September 2002 by a

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723 *S* (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008).
724 Ibid.
725 *PACE* s 64(1A); *Criminal Justice and Police Act 2001* (UK) c16, (*CJPA*) s 82.
majority of two to one judges. Finally, the case was heard by the House of Lords (the UK Court of final appeal) in June 2004 and their appeal was again dismissed.

Procedure of the Court
On 16 August 2004, two applicants then lodged their applications (nos 30562/04 and 30566/04) with the ECtHR against the UK of Great Britain and Northern Ireland under Article 34 of the ECHR on the ground that the retention of their fingerprints and cellular samples and DNA profiles by the UK police, even after being discharged and acquitted from the criminal proceedings, was a violation of their human rights and right to privacy under Article 8 of the ECHR. In their complaint the applicants also argued that the retention of their DNA data amounted to unfair discrimination and was contrary to their entitlement to privacy under Article 14 of the same Convention and therefore contravened their right to fair and equal treatment, that is, they expected equal treatment from the government to that accorded other innocent citizens whose DNA samples and profiles are not retained in the database. They argued that the retention of their DNA data, despite their not being guilty of any crime, represented a discriminatory approach of the government. Moreover, since such an approach permits the police to retain the DNA data of persons charged but not convicted, this approach creates a sub-group among innocent population.

On 16 January 2007, the case was declared admissible and the Chamber to which the case was assigned decided to relinquish jurisdiction to the Grand Chamber on 10 July 2007.

Decision of the Court

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728 S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [13].
730 S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [1].
731 Ibid [126].
733 S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [4].
In its judgment ECtHR noted that cellular samples contained much sensitive information about an individual, including their health information. DNA information is also contained unique genetic code, thus familial nature and it is, therefore, of great significance both for the individuals and their relatives.\textsuperscript{734} Moreover, DNA profiles also create the possibility for drawing inferences about ethnic origin. Because of these special characteristics of DNA data, their retention is considered as a threat to the respect for the private life. As a result, the court concluded that the retention of both cellular samples and DNA profiles amounted to a violation of the appellants’ right to respect for their private life, in other words their ‘right to privacy’ under Article 8 of the \textit{ECHR}. And also the indefinite retention of DNA samples and the indefinite speculative searching of profiles taken from individuals who were once subject to criminal charge is a proportionate breach of their right to privacy under the same provision.\textsuperscript{735}

\textbf{(b) Ragnhildur Guðmundsdóttir v State of Iceland}

Again in another case, the individual’s right to genetic privacy is constitutionally and judicially recognised by the Icelandic Supreme Court (SC). It forms a precedent domestically for Iceland and could prove informative for other countries that have begun to retain and use human genetic information. \textit{Ragnhildur Guðmundsdóttir v State of Iceland}\textsuperscript{736} is, in regard to privacy and informed consent issues, a landmark judicial decision of international importance in the arena of genetic privacy protection.

\textit{Facts of the Case}

In this case, the plaintiff, Ms Guðmundsdóttir, was born in 1985 and had two brothers who did not object to the prosecution of this case. The plaintiff’s father, Guðmundur Ingólfsson, died on 12 August 1991. On 16 February 2000, the plaintiff applied through her guardian, under Article 8 of the \textit{Health Sector Database (HSD)}

\textsuperscript{734} Ibid [72].
\textsuperscript{735} Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32, 548.
\textsuperscript{736} \textit{Ragnhildur Guðmundsdóttir V State of Iceland} [2003] Supreme Court Verdict No 2003–4153, Case No 151/2003. This decision was delivered on 27 November 2003, but its English translation was available in April 2004, a copy of English translation is on the website of the \textit{Mannvernd} — an association formed to promote ethical standards in medical research, science and in the biotechnology industry in Iceland.
Act, to the Medical Director of Health (MDH) of Iceland, requesting that
genealogical and genetic information contained in her father’s medical records not be
transferred to the HSD. On 21 February 2001, the MDH refused the plaintiff’s
application. On 30 April 2001, the plaintiff brought an action in the District Court
challenging the decision of the MDH, and the District Court dismissed the plaintiff’s
claim and confirmed the decision of the MDH. The plaintiff then appealed to the
Supreme Court of Iceland on 29 April 2003 calling for a reversal of the refusal by
MDH, a refusal that would allow her father’s health information to be transferred
from his medical records to the HSD.

Procedure and Argument of the Case
According to the principles of Icelandic law, individuals’ personal rights generally
expire upon their death in so far as legislation does not provide otherwise. Article 8
of the HSD Act ‘does not provide any right for the descendants or other relatives of
deceased persons to request and act on their behalf, that information in their medical
records should be withheld from the HSD’. Moreover, there were no other sources
of law from which such a rule could be inferred. Therefore, it was argued that [t]he
appellant ... cannot exercise this right as her deceased father’s substitute’. To
prove her standing, the appellant showed that the transfer of her deceased father’s
 genetic information directly implicated her right to privacy and gave her a personal
right of action. The Iceland SC extensively reviewed the nature and content of
information held in a patient’s medical records and, accordingly, agreed that the
appellant had a standing to bring action, since the appellant bases her legitimate
interest in the case on the fact that:

[S]he has a personal interest in preventing the transfer of data from her father’s
medical records to the Health Sector Database, as it is possible to infer, from the
data, information relating to her father’s hereditary characteristics which could
also apply to herself. ... In light of this, and with reference in other respects to
the reasoning of the District Court, the argument of the Appellant is accepted
that, for reasons of personal privacy, she may have an interest in preventing

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737 Health Sector Database Act 1998 (Act No 139).
738 Ragnhildur Guðmundsdóttir Supreme Court Verdict No 2003–4153, Case No 151/2003
Ragnhildur Guðmundsdóttir V State of Iceland [2003] Supreme Court Verdict No 2003–4153, Case
739 Ibid.
740 Remigius N Nwabeuze, 'The Concept of Sepulchral Rights in Canada and the US in the Age of
information of this sort about her father from being transferred into the database, and therefore her right to make the claims that she is making in the case is admitted.741

Another significant point is that extensive information about people’s health is entered into medical records (including their medical treatment, lifestyles, social circumstances, employment and family) and later transferred to the database, and they contain a detailed identification of the person and information of this kind can related to some of the most intimately private affairs of the person concerned.742 Paragraph 1 of Article 71 of the Icelandic Constitution743 applies to such kind of information and it guarantees protection of privacy in this respect. This provision, therefore, imposes obligations on the legislature to ensure the security and protection of such information.

Owing to obligations imposed on the legislature by paragraph 1 of Article 71 of the Constitution to ensure protection of privacy, … this assurance cannot be replaced by various forms of monitoring [mechanism] … which is entrusted to public agencies and committees …744

There is also a lack of informed consent. Under the provisions of the HSD Act, there is no requirement to take informed consent from the data provider, but there is a provision for ‘presumed consent’745 (namely, that if one does not opt out in regard to the continued presence of their information on the database, it will be presumed that they have consented to its retention). The lack of informed consent was another point of contention in the ongoing debate about the legitimacy of the HSD Act.746

Decision of the Court

Finally, the Icelandic SC acknowledges that Ms Guðmundsdóttir has a legal standing in preventing of her deceased father’s information being transferred from the medical records to the HSD, because of the Constitutional protection of ‘right to privacy’. 

743 Constitution of the Republic of Iceland, amended 24th June 1999 (Iceland) art 71[1].
745 ‘Presumed consent’ means where the data subject has not actually been consented, but from other circumstances or from their attitude it can be presumed that they have consented on a particular issue. On the other hand ‘Informed consent’ is based on an understanding of what is to be done, why, and what will happen to the results. Their practical implications and legal consequences are also different.
746 Mannvernd, Icelanders for Ethics in Science and Medicine, ‘A Landmark Decision by the Icelandic Supreme Court: The Icelandic Health Sector Database Act stricken down as unconstitutional’ (Press Release, 30 March 2004).
The Court also recognises that information about Ms Guðmundsdóttir could be inferred from data related to the hereditary characteristics of her father. After a detailed analysis of provisions of the HSD, particularly those relating to the protection of information in the medical records and its transfer to the HSD, the SC of Iceland opined that the HSD did not adequately protect plaintiff’s privacy up to the constitutionally required level. Therefore, the SC upheld the plaintiff’s right to prevent the transfer of her father’s genealogical and genetic information into the HSD. It shows that the court sets clear limits as to how far commercial population genomics and biotechnology can intrude into the private lives of citizens.747

(c) John Moore v Regents of the University of California

In another most pertinent legal case — Moore v Regents of the University of California748 — the issue of informed consent has been raised and discussed along with other issues. It is a well-recognised principle that ‘informed consent’ is one of the pre-conditions of ensuring privacy. In this case, although the privacy of John Moore was not the issue, the principle and necessity of informed consent was argued and approved judicially. The requirement for ‘informed consent’ is always vital while protecting privacy of someone’s genetic information.

Facts and Procedures of the Case

The plaintiff and appellant of this case, Mr John Moore, had undergone treatment for hairy cell leukaemia, a relatively rare form of blood cancer, at the Medical Center of the University of California at Los Angeles (UCLA) under the supervision of Dr David W Golde.749 After being informed that he had leukemia, Mr Moore first visited the UCLA Medical Center on 5 October 1976. After examining Moore’s blood, bone marrow aspirate, and other bodily fluids, Golde confirmed his disease and on 8 October 1976 recommended that his (Moore’s) spleen be removed in order to slow down the progress of the disease.750 ‘Moore signed a consent form authorising the splenectomy’751 and the subsequent disposal by the hospital. The operation was duly performed on 20 October 1976. Golde and other defendants were

748 John Moore, 51 Cal 3d 120; 271 Cal Rptr 146; 793 P 2d 479 (Cal, 1990).
750 Ibid.
751 Ibid.
already well aware of the economic value of Moore’s spleen\textsuperscript{752} and, therefore, Golde and Quan (a researcher employed by the hospital’s Regents) had made arrangements to obtain portions of Moore’s spleen following its removal and to take them to a separate research unit.\textsuperscript{753} These research activities had no connection with Moore’s medical treatment. The most significant point is that in the original consent form, neither Golde nor Quan had informed Moore of the planned research or of the financial value of his cells. There was no full and adequate disclosure regarding tissue use. Yet it was on the basis of the fiduciary relationship between the physician and the patient that Moore signed a written consent form authorising the splenectomy, a form which did not mention the research to be performed on the cells excised from Moore’s body.\textsuperscript{754}

Later, in accordance with the advice of his doctor (Dr Golde) and based upon the fiduciary relationship between them, Moore returned to the UCLA Medical Center several times between November 1976 and September 1983. He was also informed that such visits were necessary for his health.\textsuperscript{755} During these visits, Golde collected more samples (such as, blood, blood serum, skin, bone marrow aspirate, and sperm) from his body,\textsuperscript{756} and this he did (along with other defendants) while fully concealing the fact that this collection was unrelated to his (Moore) treatment and, indeed, that the main intention of the defendants was to conduct research using Moore’s cells and to financially benefit from the exploitation of that research made possible only by the continuing exploitation of the (now artificially maintained) patient-doctor relationship between Golde and Moore.\textsuperscript{757} In September of 1983, during one of these follow up visits, Moore was asked to sign an other consent form for the use of his ‘blood and/or bone marrow’ for research purposes and to sign over any rights to any product developed from such material. The consent form included:

\textsuperscript{752} Ibid 51 Cal 3d 120.
\textsuperscript{753} Ibid 793 P 2d 481(Cal, 1990).
\textsuperscript{755} Burke and Schmidt, above n 754; Dorney, above n 754.
\textsuperscript{756} \textit{John Moore}, 793 P 2d 481(Cal, 1990). See also Burke and Schmidt, above n 754.
\textsuperscript{757} Burke and Schmidt, above n 754, 219.
a portion where the individual was to circle either ‘I do’, or ‘I do not’
“voluntarily grant to the University of California any and all rights I, or my
heirs, may have in any cell-line or any other potential product which might be
developed from the blood and/or bone marrow obtained from me”.$^{758}$

He signed the consent form, but Moore claims that he circled the ‘I do not consent’
option on the consent form and this fact finally caused him to see an attorney who
commenced the investigation which led to the filing of the law suit.$^{759}$ He discovered
that his physicians had earned millions of dollars from a cell-line developed from his
cells, but they refused to give him a share of the earnings.$^{760}$ Accordingly, Moore
sued the physicians in the California Court.$^{761}$ Moore repeatedly alleged that Golde
did not disclose him (Moore) his research and economic interest in Moore’s cells and
the research conducted on them, and failed to inform him before starting his
treatment and while later collecting his cells.$^{762}$ As a result, along with his claim for
property rights, one of the main claims was that there was a breach of fiduciary duty
to disclose material facts to him as well as a failure on the part of his doctor (Dr
Golde) to obtain his (Moore’s) informed consent.$^{763}$

**Judgment of the Court**

Finding Moore’s allegations inadequate in several respects, the trial court dismissed
the Moore’s complaint.$^{764}$ On appeal, the court of Appeals reversed the decision of
the trial court.$^{765}$ The appellate Court judged that he had the right to his own body

$^{758}$ Moore v Regents of the University of California, 249 Cal Rptr 494 (1988) 531–2 (quoting from a


$^{761}$ Rendtorff, above n 760.

$^{762}$ Burke and Schmidt, above n 754, 221–2.

$^{763}$ John Moore, 793 P 2d 482 n 4(Cal, 1990), cited in Burke and Schmidt, above n 754, 224; Medical and Public Health Law Site LSU Law Centre, above n 735.

$^{764}$ John Moore, 215 Cal App 3d, 720-21, 249 Cal Rptr, 501, cited in Dorney, above n 754, 341; see also John Moore, 793 P 2d 482, n 5 (Cal, 1990), cited in Burke and Schmidt, above n 754, 224.

and should have a share in the economic gains. The California Supreme Court then granted review of the case. The Supreme Court subsequently held that ‘the allegations of Moore’s third amended complaint state a cause of action for breach of fiduciary duty or lack of informed consent, but not conversion’. That means this California SC arrived at the opposite judgment to that of the appellate court and held that individual concerned did not retain any property interest in tissue removed during surgery and, therefore, Moore had neither property rights in his discarded cells nor he could own them in the sense of having right to profit. It was also held that Californian statutes drastically limit the patient’s interest in excised cells; and the patented cell line is ‘both factually and legally distinct from the cells taken from Moore’s body. However, the court concluded that a physician or a doctor must disclose all the material facts, or any kinds of personal interests (whether research or economic) that may affect his medical judgment, and especially which is not related to the patient’s health and treatment. A physician’s failure to do so may give rise to a cause of action for performing medical activities without informed consent or in breach of fiduciary duty. In other words, the principle of informed consent requires that the patient should be told of the possibility of using his or her bodily cells by their physicians and should be given the opportunity to decide whether or not to permit such use. Here Dr Golde and other defendants were under an obligation to reveal their financial interest to him (Moore) that they had in Moore’s cells. In this case, the principle of informed consent has been preserved and the proper ‘practice of obtaining consent for the use of genetic material (such as DNA) for diagnosis and banking has been highlighted.’ The interest of privacy and dignity are protected by informed consent. Therefore it can be argued that Moore’s

766 John Moore, 249 Cal Rptr 503. See also Dorney, above n 754, 341–2.
767 John Moore, 252 Cal Rptr 816; 763 P 2d 479 (1988). See also Dorney, above n 754, 342.
768 John Moore, 51 Cal 3d 120, 147; 793 P 2d 479, 497; 271 Cal Rptr 146, 164. See also Dorney, above n 754, 342.
772 John Moore, 51 Cal 3d 120 (Cal, 1990).
773 Reilly, above n 210, 18–19.
774 Burke and Schmidt, above n 754, 225.
775 Knoppers and Laberge, above n 46.
interest in his bodily integrity and privacy are protected by the principle of informed consent.\footnote{Although the right to privacy was not an issue and it was not claimed by the plaintiff and appellant in this case.}

3.1.3.6 Implication of Case-Laws in Human Rights and Genetic Privacy Protection

From the above discussion it is evident that the Marper case is specifically concerned with privacy issues raised by the retention of DNA samples in the NDNAD, the UK. In this judgment, the necessity for the protection of privacy and human rights while using DNA samples and profiles in the case investigation process has been considered with particular attention. Through this judgment, the ECtHR has created an example at the regional level to protect human rights and privacy in the area of retention and use of a suspect’s DNA sample and profiles. This judicial principle can also be a good point of reference for the courts of other jurisdictions judging similar kinds of issues. Human rights and privacy protection in the process of justice delivery system has been judicially recognised for the first time in the world history. Therefore, this judgment is one of the significant points of justification for this study.

Through the Ragnhildur Guðmundsdóttir case, the ‘right to genetic privacy’ is again protected and confirmed judicially. It also recognises that the right to an individual’s privacy can be violated by the use of his or her close relative’s genetic information. The basic essence (that is, familial nature) of human genetic information is also recognised in this judgment. Because of this familial or hereditary nature of DNA information, it demands a special type of privacy protection. It can also be said that this judgment only recognises genetic privacy in the context of the retention or transfer of someone’s medical records in relation to a health sector database. However, although this case did not address the issues and implications for the forensic use of DNA data, it is possible to infer from this judgment that since the DNA information contains someone’s health secrets or hereditary characteristics including his family members, such a principle is also applicable with regards to DNA samples and profiles of suspects or accused persons. It can further be argued
that an almost similar degree of privacy protection should be claimed for DNA data collected and retained for forensic purposes.

The case-law analysis highlights that the idea of ‘genetic privacy’ or urge for protection of genetic information has been recognised in legislations and judicial decisions of a number of countries and also in various regional and international instruments. The case law may not be directly related to genetic privacy protection in the context of criminal case investigation but the rulings nonetheless have some indirect application. This is particularly the findings of Guðmundsdóttir and the Moore cases, where although no judicial principle for the protection of genetic privacy in the context of criminal case investigation was adopted; in both cases, however, the ‘right to genetic privacy’ was judicially recognised in the context of medical research and or database. Further, in the case of Guðmundsdótti case the principles of ‘genetic privacy protection’ and in the case of Moore the ‘right to informed consent’ have been established and these principles are applicable in all related cases where right to genetic privacy is an issue irrespective of the context. The decision in the Marper case is another significant platform for the claimants of privacy rights in the context of forensic use of DNA information. These judgments are substantial points of reference for governments, judges, lawyers and policy makers.

It has already been acknowledged that forensic use of DNA information involves two opposite but essential interests: one is a claim for the ‘right to privacy and human rights’, and other is the necessity to detect criminals for the sake of the national interest or security. The following section will particularly address these essential but opposite interests: the ‘forensic use of DNA information v the right to genetic privacy’.

3.1.4  FORENSIC USE OF DNA INFORMATION V THE RIGHT TO PRIVACY

It is well established that the forensic use of DNA (that is, DNA profiling) has become a very powerful tool for law enforcement purposes and it is being

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frequently used to catch heinous criminals. Cases that were previously almost impossible to solve can now be easily resolved with the use of DNA profiling techniques. The dilemma, however, is that DNA does far more than simply enable a matching of samples for identification purposes, it also reveals pre-disposition of individuals to illness as well as other personal information that affect human rights and privacy. The supporters of this technique in its forensic use claim that ‘DNA testing is limited to DNA that does not reveal specific characteristics’; rather, it is simply used for identification purposes. It is also claimed that the privacy (including genetic privacy and other rights of suspects, prisoners or criminals could be compromised for the sake of justice. In support of this view, Merryn Ekberg argued that:

...in forensic investigations, the right of victims to justice and retribution and the collective right of society to safety and security trumps the privacy rights of suspects and criminals.\(^779\)

On the other hand, privacy advocates have a number of concerns. They are fearful about what may be able to found from DNA samples at some later stage,\(^780\) and worried about the scope for storing DNA samples for extended and uncertain periods of time, and the possibility of creating numerous copies from a single sample, and so on.

Another big concern is that the secrets that are hidden in DNA could be revealed to other parties if DNA samples were taken without the knowledge of the person concerned. For instance, using residues on a glass or some other source, a ‘genome hacker’ could obtain a comprehensive scan of that person’s genome, which may reveal their susceptibility to a wide range of diseases. In recent years, some companies have started to offer personal genome scans to the public over the internet in a process that, according to Aldhous and Reilly, could lead to another person’s DNA being ‘hacked’, that is, be subject to unsanctioned sampling by another who

\(^{778}\) Michael Higgins, 'Acid Test: DNA Databases Help Nail Slippery Criminals, but Their Potential Uses Make Privacy Advocates Nervous When it Comes to Arrestees and Ordinary Citizens' (1999) 85(10) American Bar Association Journal 64, 64.

\(^{779}\) Ekberg, above n 8, 9; see also Hudson v Palmer 468 US 517, 537 (1984). In this case, the US Supreme Court ruled that prisoners confined in a detention facility have no reasonable expectation of privacy entitling them to the protection of the Fourth Amendment of US Constitution. The court, on the basis of security, has denied prisoners any right to privacy.

\(^{780}\) Higgins, above n 778, 65.
then submits and obtains the analysis and access to knowledge that they should not rightfully possess.\textsuperscript{781} ‘Hacking’ someone’s DNA without their consent is a significant genetic privacy issue. In terms of forensic investigation, those strongly supportive of the rights of suspects and others to privacy (including genetic privacy) would argue that without informed consent, the collection and analysis and use of DNA in regard to later crimes (such as in a blanket DNA profile comparison in the absence of any other evidence linking the crime to the person) or the unspecified use by third parties of that DNA sample or information — particularly in regard to that of those who have not been convicted for a criminal offence — could essentially amount to a form of ‘hacking’.

It is, therefore, essential to protect these two mutually dependent interests of society (that is, forensic use of DNA for enforcement of justice and the protection of human rights and privacy). In the field of forensics, ‘[t]he collection, storage and use of sensitive personal data ... always raise ethical social and legal issues’.\textsuperscript{782} Some vital privacy issues include collection and retention of DNA samples and profiles for an unknown period of time, especially those taken from the individuals without their consent, and the extensive power and use genetic samples and information by the law enforcing agencies.\textsuperscript{783} Williams and Johnson highlighted some vital privacy issues:

\begin{quote}
[T]he spread of forensic DNA profiling and databasing has also prompted a wide range of concerns about problems that may arise from the storage of tissue samples (especially those taken from individuals without consent) and the proliferating uses of genetic information by the police. ... the threat to the bodily integrity of citizens who are subject to the forced and non-consensual sampling of their genetic material; the intrusion and denigration of privacy rights caused by the storage and use of tissue samples; the potential for the future misuse of such samples held in state and privately owned laboratories; the prospect of long term bio-surveillance occasioned by the storage of genetic information in police databases and biological samples in forensic laboratories; and the possibility for the deceptive use of DNA forensic evidence in police investigations and criminal prosecution.\textsuperscript{784}
\end{quote}

\textsuperscript{781} Peter Aldhous and Michael Reilly, 'How My Genome was Hacked' (2009) 201(2701) New Scientist 6, 7. According to Green and Annas, for a hacker could collect a presidential candidate’s DNA and analyse it to assess genetic risk. Such information could then be used for or (more likely) against the candidate: Robert C Green and George J Annas, ‘The Genetic Privacy of Presidential Candidates’ (2008) 359(21) New England Journal of Medicine 2192, 2192. This is not only a threat for politicians or famous persons but also for ordinary people (for example, in determining paternity).
\textsuperscript{782} Levitt, above n 402, 236.
\textsuperscript{783} Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32, 546.
\textsuperscript{784} The literature on these matters is extensive. Some significant literature that cited in Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32, 546, include: P R Billings (ed),
The following section will determine the extent to which human rights and genetic privacy are protected in existing justice delivery systems:

### 3.1.4.1 How Far Are Our Human Rights and Privacy Protected?

In regard to human identification issues, the freedom or liberty, secrecy, autonomy and privacy interest of individuals are highly connected. At present, addresses, telephone numbers, social security numbers, credit ratings, range of incomes, demographic categories, and information on hobbies of many individuals in a particular society are currently available from various computerised data sources.\(^7\)\(^8\)\(^5\) Even such simple information about human identity requires confidentiality to avoid unwarranted intrusions into people’s lives (for example, advertisers cross-matching income and purchase patterns to target prospects).

More detailed information related to identity would require additional security. Just like fingerprint files and other personal identity related data, DNA samples and profiles could be used to search and correlate criminal and/ or medical record databases but such samples and profiles are far more revealing than are fingerprints. The collection and storage of materials and profiles in the latter database is also not usually associated with consent for such a purpose. Computer storage of DNA information therefore increases the possibilities for further misuse, in particular the violation of privacy.

DNA profiling, in principle, has the potential to provide personal information — such as medical characteristics, physical traits, and consanguinity — that carries with it risks of discrimination. For instance, the Committee on DNA Technology in Forensic Science mentioned that the forensic restriction fragment length polymorphism (REL) typing markers\(^7\)\(^8\)\(^6\) are not known to be associated with particular traits or medical conditions, but there is a possibility that they might be

\(^7\)\(^8\)\(^5\) Committee on DNA Technology in Forensic Science, above n 19, 114–15.

\(^7\)\(^8\)\(^6\) It has been discussed in Chapter 2. For further details please see section 2.1.3.3 of Chapter 2.
used in the future. The current Polymerase Chain Reaction (PCR) typing uses the human leucocyte antigen (HLA) DQ locus (area) in a gene that controls many important immunological functions and is associated with diseases.

Consequently, DNA profiling has raised considerably greater issues of privacy than does ordinary fingerprinting. In addition, potential privacy threats arise from the fact that the original DNA samples are generally retained as well as the DNA profiles held on the databases. Further information could be derived from those samples in future, or new technologies could lead to new information. One of the most important privacy concerns in the context of forensic use of DNA data is the collection and retention of powerful DNA information (that is, DNA sample and profiles) on a routine basis. In some cases, individuals are also coerced into providing DNA samples in ‘dragnets’ or a mass screening process, or the relatives of some criminals or suspects are asked to provide their samples, but after the case is resolved, those original samples (from parties innocent in relation to the offence being investigated) are retained for an uncertain period of time for future use. Privacy implications are also raised through the retention of DNA samples and profiles.

Once there is a crime committed, or there is a suspicion that one has been committed, law enforcement agencies require biological information from individuals for law enforcement purposes (such as in the identification of criminals, or missing persons, or in regard to an issue of parentage). Very often they do so in connection with the investigation of a case.

Rothstein and Talbott Meagher, in their 2006 article, contrast the use of DNA testing and the simple drug testing of blood and saliva samples (the latter attracting less community anxiety than the former). In their example, police investigating a series of

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787 This is one of the significant techniques used for DNA profiling.
788 Committee on DNA Technology in Forensic Science, above n 19, 114–15.
789 Ibid 113.
790 This is the process through which police seek and collect DNA samples from the public to catch the guilty person.
791 Rothstein and Meagher, above n 50, 160.
murder cases at pharmacies in a particular area find that all of the murders committed during a series of armed robberies have another feature in common, that is, that the thief is in the habit of taking an expensive and relatively rare drug. From this information police speculate that the thief is dependent on a particular type of medicine. In fact, such information could also indicate that a near family member or other relative requires this medication. As this is the only clue, in order to identify the actual offender, police could ask the people of that locality to undergo a blood or saliva test to detect the presence of that drug. Rothstein and Talbott Meagher argue that the drug test reveals more personal information (in regard to illness on the basis of the drug taken) than any a current DNA test, but add that such drug testing lacks the specificity of a DNA test which would be able to identify the individual involved if there was a sample left at the SOCs. Nevertheless the samples supplied in any mass screening (including blood or saliva for drug analysis) could be subsequently used for DNA analysis and divulge personal health and other information about all the individuals who have been tested. Even though they are innocent, their information as well as their personal details might be retained for an indefinite period on the forensic database. The test can reveal sensitive personal health information\textsuperscript{793} which is vital for both individual and his or her family. It is no wonder, therefore, that some object (usually ineffectually) to the submission of samples for DNA analysis.

There is also a great risk posed to society by creation of DNA database and storage of DNA information, because the usual practices of government in relation to the protection of individual privacy and autonomy (particularly in regard to material collected and retained for forensic purposes) is inconsistent with the principles of human rights and democracy. For instance, in the early thirties, when the original Social Security Act was passed in the US, the Congress provided that the social security number should not be used other than the purpose envisioned in this Act. However, a considerable number of databanks have used the social security numbers of the US citizens in the name of effectiveness and rationality. These include various government and private entities. For example, persons will be asked to supply their social security numbers when applying for drivers licence application, in regard to

\textsuperscript{793} Rothstein and Meagher, above n 50, 160.
employment, and by banking and credit card companies. Such use includes providing the government with a permanent databank about many of the activities of the US citizens and covering every sphere of their life.\textsuperscript{794} If the DNA databases (which contained the sensitive information) are as easily accessible and used by third parties as social security number of US, there is enough reason to be apprehensive regarding possible violation of human rights and privacy. It can also be argued that genetic privacy is more sensitive than the social security information as it affects life and health of a number of people. Consequently it demands far greater protection.

The above discussion highlights that there are a number of human right and privacy violation issues in a number of contexts which are ongoing in the existing DNA database practices or systems. Some notable forms of privacy violations with regard to the forensic use of human DNA data, which are identified and considered significant by the author, are discussed below:

(a) Retention of DNA Samples and Profiles

Cellular or DNA samples are retained for the purposes of possible later verification of a profile, or correcting some error, for quality control purposes (as happens in case of CODIS),\textsuperscript{795} or for resolving some subsequent disputes, and also for further research. The justification for this retention is also based on the necessity to facilitate any re-profiling that may become necessary ‘if the current profiling methodologies change to include more loci or even shift more radically to new kinds of technological platforms’ such as Single-Nucleotide Polymorphism (SNP)\textsuperscript{796} (the process most likely to replace STR analysis used in the formation of DNA databases). However, retention of DNA samples and profiles for an unspecified

\textsuperscript{794} E Donald Shapiro and Michelle L Weinberg, 'DNA Data Banking: The Dangerous Erosion of Privacy' (1990) 38 Cleveland State Law Review 455, 477.
\textsuperscript{796} P Gill and D J Werrett, 'An Assessment of Whether SNPs will Replace STRs in National DNA Databases' (2004) 44(1) Science and Justice 51–3, cited in Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32. SNP is the simplest type of polymorphism and it is single base difference in the sequence of the DNA. SNPs normally have just two alleles — one allele with a guanine (G) and one with an adenine (A), and therefore are not highly polymorphism. However, SNPs are so abundant throughout the genome that it is theoretically possible to type hundreds of them, which can make the combined power of discrimination very high. For further details see Goodwin, Linacre and Hadi, above n 207, 13–14. See also Wilson Wall, Genetics and DNA Technology: Legal Aspects (Cavendish Publishing, 2\textsuperscript{nd} ed, 2004) 57.
period of time poses serious threats to individual or social privacy. Privacy violation can occur in two ways. The first is by interfering with a person’s physical integrity (physical genetic privacy) to obtain a DNA sample. The second is by accessing those databases which contain potentially very much greater and more personal, sensitive and detailed information concerning individuals (and their relatives) than other forms of data (such as fingerprints). The latter constitutes a breach of informational privacy. The kind of knowledge in relation to someone’s life which is possible to gather from DNA samples has no parallel in the history of science and technology, and it raises profound questions about the protection of human rights and privacy. While evaluating the privacy implications, it is necessary to evaluate the challenges to the benefits of retention of DNA samples in databases. Moreover collection and storage of large quantities of biological samples by law enforcement agencies call for specific regulations controlling fair use and terms of retention which balance human rights and privacy protection.

(b) Unfettered Power Exercised by Police

There is another ancillary or interconnected problem with regard to retention of DNA samples and profiles, namely the unfettered power exercised by police. For instance, the UK police force exercise some unfettered powers. Moreover, police access to human DNA data, which can identify individuals as well as contain personal information, has some obvious consequences in terms of a right to privacy. For example, while ‘many Australian jurisdictions expressly confine the police’s use and disclosure of information obtained from forensic procedures to investigative purposes’, such police use and or disclosure of information has nevertheless been seen as ‘encompass[ing] potentially broad intrusions into privacy’.

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797 Information about a latent genetic illness or other kinds of predisposition to disease can be revealed by DNA sample. It may even reveal behavioural tendencies, or important information about the individual that he does not even know himself, such as the true nature of his family relationships.

798 Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32.

799 Yee, above n 2, 480.

800 PACE Act s 64(1A) and CJPA s 82.


802 Crimes Act ss 23YDAE and 23YO; Crimes (Forensic Procedures) Act 2000 (ACT) Crimes (Forensic Procedures) Act 2002 (NI) s 147B (1); Forensic Procedures Act 2000 (Tas) s 53; Crimes Act 1958 (Vic) ss 464ZGH, 464ZGK; Criminal Investigation (Identifying People) Act 2002 (WA) s 73; Police Power and Responsibilities Act 2000 (Qld) s 489(3); Criminal Law (Forensic Procedures) Act 2007 (SA) s 45(2), cited in Gans, above n 782, 111.

803 Gans, above n 801, 111.
Australian police can lawfully obtain a person’s DNA profile without either a court order or consent. They can do so by collecting that person’s body sample from an item the person has touched.\textsuperscript{804} In addition, the collected DNA information — from suspects, criminals or other innocent persons by the police — could be later used to identify them in regard to subsequent activities where a sample is taken and found to match the original.\textsuperscript{805}

Again, as Gans observes, if the police have obtained a known person’s DNA profile and it is compared with all other profiles derived from crime scene samples,

\begin{quote}
then the police can potentially learn of any of the person’s behaviour, criminal or innocent, or associated, accurately or not, with any crime, actual or apparent, at any time, past or future.\textsuperscript{806}
\end{quote}

According to such practice under the Australian legislation, all offenders and suspects whose profile is obtained by the police, consensually or otherwise, lawfully face loss of their privacy.\textsuperscript{807} The basis often given is the risk of recidivism among the offender population (once so identified) or among persons who have come to the attention of police in similar matters but not found to have been the offender in that instance, and the relative ease of identification of suspect/s.

Furthermore, in Australia DNA profiles from volunteers and even victims can also be used to identify suspects or offenders. Gans points out that while all Australian statutes appear to provide for the use of samples volunteered only ‘for the “purpose” for which the profile was volunteered’; nevertheless they may be asked not to so limit the use of the sample. He also notes an instance where victim DNA profile was used to assist identification of a relative for an unrelated offence.\textsuperscript{808}

\begin{flushright}
\textsuperscript{804} Ibid.
\textsuperscript{805} Ibid 112.
\textsuperscript{806} Such behaviour may include staying in a hotel, driving a car while drunken, using a syringe, handling a weapon or having sex. For further details see ibid 111.
\textsuperscript{807} Ibid.
\textsuperscript{808} Ibid.
\end{flushright}

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It is also important to recognise that the police in England and Wales are given extensive powers under section 64(1A) of the *Police and Criminal Evidence Act*\(^{809}\) to retain DNA samples and data derived from suspects indefinitely. The implication of this is that the police are never required to destroy samples that they have legitimately collected.

In addition, DNA databanking could lead to an unprecedented and extremely powerful means of governmental intrusion into a citizen’s most private sanctuary.\(^{810}\) The power given to the law enforcement agencies could be misused either for political or other reasons. For instance, when DNA samples and/or information are in the custody of police, there is a possibility that such information could be used by the government other than its original purposes.\(^ {811}\) The problem can be more acute for developing countries, where the judicial systems are not very well developed. There is also a high chance that corrupt practices might begin in the use of DNA database in those countries, such as manipulating innocent people, harassing the leaders of the opposition parties, and also making transactions with some interested third parties with regard to this highly sensitive information.

**(c) Issues with Regards to Informed Consent**

Another interconnected issue with regards to power of the police is — the informed consent issue of sample providers (be they innocent volunteers, suspects or accused). In the investigative process, the collection and use of DNA samples without consent and/or forcibly collected from suspects also raises a question about the protection of the privacy of that person’s interests. In this regard, it can be cited that there are two rules exist in Australian jurisdictions. On one hand, in some jurisdictions police have no power to compel someone to provide their DNA sample. In such circumstances, police have to rely purely on that person’s consent to obtain their DNA.\(^ {812}\) On the other hand, in many Australian states police rely on consent even though they have

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809 *PACE Act*; see also *CJPA* s 82.

810 Shapiro and Weinberg, above n 794, 479.

811 Rothstein and Meagher, above n 50, 161.

the power to compel someone to cooperate in obtaining a sample of their DNA. However, as police have power to compel, ‘many suspects or offenders explicitly told that a refusal to consent may result in the use of force to carry out a subsequent DNA sampling order’, inevitably comply with this request. In this situation, a suspect’s consent is not voluntary and free from undue pressure. Similarly, under the UK domestic legislation if an individual is arrested in connection with a ‘recordable’ offence, the police can take fingerprints and biological samples at their discretion without the consent of the individual. In such circumstances, it is also debatable as to whether informed consent from people can truly be taken freely in the police custody during an investigation, because refusal to give a sample immediately places a person under suspicion.

(d) Controversy Regarding Familial Searching

Collection DNA samples from close relatives, including children, as a means of locating a suspect creates another human rights and privacy issue. Very often for the purpose of solving a case, ‘familial searching’ is conducted by the law enforcement agencies. The investigative benefits of this familial searching are apparent, but some obvious concerns are that a perhaps unexpected genetic link could be revealed from that searching. For example, the evidence from the ‘familial search’ might reveal that several people on the database are related to each other and also to the unknown suspect for the crime. In one notable US case, a familial search identified a perpetrator as the brother of a victim who had submitted a sample in an unrelated case. The genome speaks for itself. It tells the police that a particular

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813 Crimes Act pt ID div 3 and s 23XWC(1)(a); Crimes (Forensic Procedures) Act 2000 (ACT), applicable in Norfolk Island through its Crimes (Forensic Procedures) Act 2002 (NI) pt 2.3 and s 65(1)(a); Crimes (Forensic Procedures) Act 2000 (NSW) pt 3 and s 63(1)(a); Police Administration Act 1978 (NT) s 145(2)(a) (suspects only); Forensic Procedures Act 2000 (Tas) pt 2 div 2 (suspects only); Crimes Act 1958 (Vic) s 464R(2)(a) (suspects only); Criminal Investigation (Identifying People) Act 2002 (WA) ss 40(1) and 51(1), cited in Gans, above n 801, 111.

814 CJA s 10(2).

815 Helena Kennedy, ‘We Should Be Outraged by these DNA Databases: A Labour Peer Condemns a New Government Assault on Civil Liberties’, The Guardian (online) 14 May 2001<http://www.guardian.co.uk/education/2001/may/14/highereducation.uk>.

816 Williams and Johnson has defined the term ‘familial searching’ as it refers: to a form of database searching based on knowledge about the probability of matches between the STR markers of two members of the same family as opposed to the probability of matches between these markers when the individuals compared are unrelated.

Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32, 553.

817 United States v Davis, 657 F Supp 2d 630 (MD Ct, 2009).
person is the biological father or son or mother or sister of an offender or share in some degree of consanguinity, though they may have never met.\textsuperscript{818} In other instances, testing reveals that a relationship (for example, father-son) as putative rather than actual, with immense personal ramifications for those involved.

In addition, there also exists a greater societal interest in maintaining and promoting intact, healthy family units. Family integrity and privacy is cornerstone of human rights values. Thus, implicating family members in an investigation where a relative (genetic or social) might be involved is likely to have profound social, cultural and physical impacts on that family.\textsuperscript{819} The investigation alone has the ‘capacity to deepen painful rifts within strained familial bonds’.\textsuperscript{820} Family members may have already suffered greatly as a result of the actions of a related convicted offender, such as, incurring financial losses as a result of legal costs or thefts, or emotional losses from incarceration, abandonment, or betrayal. Criminality can tear families apart, and when the state conducts investigations based primarily on familial links, it does so with the strong likelihood of inflicting further damage.\textsuperscript{821} Even in families in which the offender’s position is reconciled, familial searching effectively turns convicted offenders into involuntary ‘genetic informants’.\textsuperscript{822} It burdens the relationship between innocent relatives and the convicted offender, for relatives to find themselves suspected of a crime they did not commit by virtue of nothing other than the biological connection.\textsuperscript{823}

DNA is much greater in terms of information derived than that flowing from any other forensic tests (such as a fingerprint) and it presents a direct challenge to basic right to privacy.\textsuperscript{824} Though the prevention of crime is one of the fundamental duties of a state, it is also necessary to protect and respect some basic ethical values of its

\textsuperscript{820} Murphy, above n 818, 319.
\textsuperscript{821} Ibid 320. See also Suter, above n 40, 364.
\textsuperscript{822} Haimes, above n 819, cited in Murphy, above n 818, 320.
\textsuperscript{823} Murphy, above n 818, 319, 320.
citizens, for example, privacy. Sometimes a suspect (though their crime is subsequently not proved beyond reasonable doubt) is forced to provide a DNA sample. In the national interest, sometimes it is essential to do so. At the same time, it is also important to obtain consent from the suspect before doing the DNA test and to destroy the DNA sample after using it. Even if, in exceptional circumstances, its retention is required, there should be some time limit on such retention and proper security measures need to be maintained in relation to the sample and the profile derived from it, because everyone has a right to privacy and a right to make an independent decision about their life.

The power of DNA and its related technology as well as their future potentialities are significant, but they raise profound questions that cannot be ignored. It is necessary to consider the serious moral dilemmas surrounding the use of DNA profiling. The societal answers require economic and legal reassessments (cost-benefit analysis) in regard to those fundamental rights of the individual versus those of society. 825 Almost all governments are required to be aware that it is simply not a matter of what the current state of DNA profiling techniques can reveal, but what might be able to be read from this technology in the near future. However, while state security measures cannot cease due to the need to protect the people generally, a balanced approach is needed. Emphasising the need to balance human rights and the technological development in the criminal justice system, Kristina Rooker highlights that:

Not everyone who is in prison is guilty and even if they are guilty they do not leave their constitutional rights and protections at the prison door. Although it is important that law enforcement officials have DNA profiles in order to solve crimes and convict criminals, it is also important that the civil liberties and privacy of inmates be protected. There needs to be a balance. 826

825 Ibid 483.
826 Kristina Rooker, The Impact of DNA Databases on Privacy (Spring 2000) Vernellia R Randall, Institute on Race, Health Care and the Law, University of Dayton School of Law, <http://academic.udayton.edu/health/05bioethics/00rooker.htm#N_3_>.
3.1.5 THE FUTURE OF FORENSIC USE OF DNA INFORMATION

3.1.5.1 Balancing State Security Measures, and Human Rights and Privacy

It is therefore argued that forensic DNA databases naturally pose a privacy threat because of the inherent nature of information contained in DNA samples. The need for some protection of personal privacy when setting up and using DNA databases is also fairly uncontroversial.\(^{827}\) Viktor Mayer-Schönberger, however, argued that:

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\text{... striking the right balance between too little protection for privacy to be preserved and too much protection for law enforcement to effectively function is not only complex, experts also disagree on exactly how that balance can be found.}\(^{828}\)
\]

Since the early 1990s, governments and legislators throughout the world have been struggling to keep a balance between two opposing but mutually significant interests: the establishment and uses of DNA databases in their own jurisdiction as well as concerns with regards to human rights and privacy.\(^{829}\) This remains a big legal and policy concern up to the present time, and determining the balance between the investigative benefits of DNA identification versus its privacy implications is the subject of continuous debate for almost all developed and developing countries across the globe. Governments, policymakers, and legislators worldwide are, therefore, trying to strike a rational and effective balance between the possible pitfalls or intrusiveness and the potentials or effectiveness of the use of forensic DNA profiling and databasing.\(^{830}\) Such a balanced approach will foster use of the advances in genetic technology that serve social justice and similar interests, along with providing sufficient guarantee for the world community that such advances ‘are subject to proper ethical scrutiny and legal control’.\(^{831}\)

DNA profiling has undoubtedly become a useful tool in the justice delivery system, especially in criminal investigations. Nevertheless, it is important to differentiate between the role of DNA samples and profiles particularly in case investigation

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\(^{827}\) This assumption while uncontroversial is not universally held. For further details see Anita L Allen, ‘Privacy-as-Data Control: Conceptual, Practical and Moral Limits of the Paradigm’ (2000) 32 Connecticut Law Review 861, cited in Mayer-Schönberger, above n 440, 225–6.

\(^{828}\) Mayer-Schönberger, above n 440.

\(^{829}\) Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32, 546.

\(^{830}\) Ibid.

\(^{831}\) Weisbrot, Spiteri and Carney, above n 187, 131.
process, and the role of DNA databases in general. Searching for a DNA profile match in order to solve a particular case from among known suspects, and destruction of sample or profiles after resolution of that case does not require a database. On the other hand, the retention of DNA samples and profiles is justified in some circumstances, for example, if a case needs to be reopened, or a fresh investigation is required, or there is a doubt about the DNA analysis result.\(^{832}\) The challenge, therefore, at this point is to weigh up how to determine in which cases it is important to retain the DNA profile or sample (and if it is so essential, how to ensure the security of such material and the privacy of the information supplied) and also in which cases it is not so relevant to retain the DNA sample and data. Such estimations, of course, depend on the country’s justice system, needs and overall situation.

Another important issue is how much access police should be given to the DNA samples after their retention. In some cases, information about a person’s genetic disorder or risk could potentially be used to identify suspects, for example, if police are looking for a person with particular disease. Currently, the police are allowed to ask for personal genetic data from an individual’s medical record, but only in preventing, detecting or prosecuting a serious crime.\(^{833}\) How far such ethical protection can be maintained by police also raises an important question. Moreover, the lack of consistent regulatory framework and inadequate monitoring mechanism regarding third parties (including government) access and use of human DNA information constitute major problems.\(^{834}\) In addition, the costs of administering and maintaining a big database and retaining millions of DNA samples are increasing day by day; and so some ‘cost-benefit analysis’ should be conducted.\(^{835}\) Therefore, balancing the benefits and dilemmas regarding the access and use DNA data is a complex issue. Mark A Rothstein and Sandra Carnahan also argued about these two opposite but essential elements:

Balancing the interests in expanded forensic DNA databases is extremely complicated. On one side are the appealing and concrete benefits of preventing and solving a range of crimes. On the other side are abstract interests in the freedom to be left alone from governmental demands for bodily specimens.  

The current use of DNA samples and profiles in the justice delivery system is not beyond debate. It obviously poses some uncertainties regarding the future use of this highly promising technology (that is, human DNA sampling and data analysis) for forensic purposes. Naturally, any initiative concerning DNA data sampling of general citizens for investigative purposes, or initiating any advanced use of DNA database should be supported by a thorough analysis of the scope, use and parameters of such a database. Most importantly, it should be remembered that “[t]here’s a difference between what one can do, scientifically or otherwise, and what one ought to do”.  

3.1.6 CONCLUSION

It has already been established that forensic DNA profiling and databases provide law enforcement agencies with an effective tool that may revolutionise the justice delivery system around the world. With continuing advances in DNA technology, such databases may become even more valuable. Application of improved technology in analysing DNA samples ‘can yield a wealth of information about an individual’ and their future well being; but such activities should not compromise human rights and privacy. The DNA databases of genetic profiles with all their inherent potentials are to be treated with the greatest respect and careful precautions taken in regard to privacy.

In order to support the case investigation process, the establishment of any forensic DNA database is an ambitious venture which requires judicial endorsement and both legislative and financial support of a government. Moreover, in order to achieve general acceptance, such an initiative must prove that the database is comprehensive enough to provide better quality information while protecting human rights and

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837 McCartney, ‘A Sceptical Approach’, above n 835 (citation omitted).
838 Yee, above n 2, 489.
privacy. To be more specific, questions regarding who should be sampled and profiled, and what information is to be generated, how will such information be used, and how the investigators will actually benefited from such a database must first be answered.  

In order to arrive at the answers to these questions, and to discover the real picture as well as to weigh the balance between privacy and state security, the author adopted two approaches. In the first phase, the author analysed the relevant legislation, case decisions and other literature. Subsequently both qualitative (case studies and interview) and quantitative (survey) methodologies are applied in this research project. In the qualitative research, analysis and findings from two case studies representing both developing and developed country are worth mentioning. Chapter 5 will visualise, investigate and examine the first case study: the ‘National DNA Database’ of the UK (that is England and Wales). Subsequently, Chapter 6 will deal with the second case study, on the ‘National Forensic DNA Profiling Laboratory’ of Bangladesh.

The next chapter (Chapter 4) will examine how these case studies are undertaken along with other strategies adopted — that is to say, the interview and survey methods. Chapter 4 will also highlight and discuss how these research methodologies and designs address the two main research questions of this study.

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839 Williams and Johnson, ‘Inclusiveness, Effectiveness and Intrusiveness’, above n 32, 556.
CHAPTER 4

4.1 SOCIO-LEGAL METHODOLOGY: EMPIRICAL ANALYSIS OF CASE STUDIES

4.1.1 INTRODUCTION

A ‘research methodology’ is a model which entails theoretical principles and a framework that provides guidelines about how research is to be done in the context of a particular paradigm and appropriate research designs or strategies that are tools that help to link the research question and the chosen method. Finally such a link determines ‘the usefulness of results or the pragmatic application of the study findings’.

The purpose of the present chapter (that is, Chapter 4) is to justify the multi-stage research design and provide the rationale for choosing socio-legal research. In this regard it is to share the earlier two chapters (that is, chapters 2 and 3), which are devoted to discussing theoretical concepts surrounding the ‘scientific evolution of DNA and DNA profiling’ as well as ‘human rights and privacy issues’. These first two chapters mainly rely on the archival research method (that is, literary review). In the subsequent chapters, a different research approach has been adopted — namely, a socio-legal approach combining both qualitative (case studies and semi-structured interview) and quantitative (survey) methods. Section 4.1.2 begins by explaining the reasons for choosing socio-legal approach. This section continues the discussion providing justification for the use of the mixed method approach, legislative as well as literary analysis, and the rationale for the empirical analysis of the case studies involved. Subsequently, section 4.1.3 explores the qualitative method — it includes case studies approach, data collection (via semi-structured interviews) procedure and ethical considerations. Sub-section 4.1.3.4 further explains the qualitative data analysis strategy focusing on interview data analysis method. Section 4.1.4 looks at

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840 A paradigm is a set of propositions that explain how the world is perceived, it contains a world view, a way of breaking down the complexity of the real world, telling researchers and social scientists in general ‘what is important, what is legitimate, what is reasonable: Michael Quinn Patton, Qualitative Evaluation and Research Methods (Sage Publications, 2nd ed, 1990) 37, cited in Sotirios Saratakos, Social Research (Macmillan Education Australia, 2nd ed, 1998) 31–2.

841 Janice M Morse, 'Designing Funded Qualitative Research' in Norman K Denzin and Yvonna S Lincoln (eds), Strategies of Qualitative Inquiry (Sage Publications, 1998) 56, 62.
the quantitative approach and finally section 4.1.5 provides a brief conclusion. In brief, this chapter has been dedicated to describing and explaining issues related to research methods, and how such methods and approaches have been applied throughout this study.

4.1.2 SOCIO-LEGAL METHODOLOGY: A MULTI-STAGE RESEARCH DESIGN

The main theme of this study is how a proper balance between human rights and the right to privacy including genetic privacy and public interest or state security could be envisioned for the ultimate protection and preservation of the forensic use of DNA samples and information. Another objective is to examine how the UK and Bangladesh (as developed and developing countries respectively) are encountering and handling these issues. In order to achieve the objectives of this project and also to answer research questions, this study has pursued the research scheme represented schematically in Figure 2 (see below). This research scheme therefore, includes the application of three different approaches utilising a socio-legal methodology, to gather research materials:

1. Analysis of literature and legislation;
2. Qualitative (case-studies and semi-structured interviews with individuals from the selected participants);
3. Quantitative (conducting survey with the same participants);

4.1.2.1 A Combined Approach: Justification for Socio-Legal Research and Mixed Methods

(a) Socio-Legal Approach

According to David Schiff, ‘the relationship of the law to a social situation, in its many aspects, is ... a necessary part of understanding of that situation’842 as legal studies differ from other fields of social sciences (such as sociology, political science, anthropology and so on) in that ‘the legal structure, because of its nature and the social functions it serves’ and thus it ‘requires a different form of analysis from

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Legal appropriateness or suitability in a given social context or situation could properly be determined by utilising empirical research methods that combine methods used in both law and social science. In the ‘law and society tradition’, such an approach may be referred to variously as “‘socio-legal research”, “new legal realism”, “empirical legal studies” or as ‘socio-legal studies’). Multi-method research (that is, the combination of law and social science methods) is, therefore, significant ‘for a better understanding of ‘the relationship of law and the social world’ as the use of several methodologies can ‘provide a more nuanced understanding of law, legal institutions and legal processes’ than can otherwise be provided given ‘the complex nature of the social world in which they operate’. Laura Beth Nielsen also argued that the:

[M]ulti-method research is perhaps the most effective way to understand the relationship of law and society. … [B]ecause … the phenomenon of law itself consists of individuals, organizational settings, institutional fields and the interaction among them, fully understanding law demands research conducted using multiple approaches.

As alluded to earlier, this study used qualitative empirical methods (including case study and semi-structured interviews) for data collection and used constant comparative method of GT for data analysis. While commonly lawyers ‘[learn] to understand using the law by focusing on a small number of important and relevant precedent bearing cases’, qualitative empirical legal research goes far beyond this. Indeed, it sets out to understand individuals’ experience of law, legal meaning, and

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843 Ibid.
845 Campbell and Wiles described socio-legal studies as ‘often employ[ing] sociology (and other social science) not so much for substantive analysis, but as a tool for data collection’ which according to them differed from the ‘sociology of law’ which further described as ‘receiv[ing] its intellectual impetus mainly from mainstream sociology’ and having the aim of ‘transcend[ing] the lawyer’s focus on legal rules and legal doctrine by remaining “exogenous to the existing legal system”, in order to “construct a theoretical understanding of that legal system in terms of the wider social structures”’, Colin M Campbell and Paul Wiles, The Study of Law in Society in Britain’ (1976) 10 Law and Society Review 547, 553, cited in Max Travers and Reza Banakar, ‘Introduction’ in Reza Banakar and Max Travers (eds), Theory and Method in Socio-Legal Research (Hart Publishing, 2005) xi.
846 Nielsen, above n 844.
847 Ibid 955.
848 Ibid 972.
By utilising different qualitative methods, empirical legal research obtains insights into ‘people’s perception[s] of law and justice’. According to this approach, analysis of law or legal issues is directly linked to the analysis of the social situation or responses from the society to which the law applies. This kind of methodology and analysis, which allows for such

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850 Ibid 927.
interrelated understandings, is therefore required. In this regard, Laura Beth Nielsen argued that:

To be effective, the law must be empirically examined in the real world and insights gleaned must inform law-makers through some sort of feedback mechanism. Although [the] multi-method [approach] is costly, rigorous empirical research … is always better than theoretical speculation or armchair empiricism based on anecdote.851

Another reason for applying the socio-legal approach is that one of two case studies of this research could not be completed only by the application of archival literature, legislative and judicial analysis. It is relevant to note here that (as alluded to earlier) a part of this research is conducted applying the quantitative method. The combination of social science research methods (qualitative and quantitative) with legal analysis was, therefore, essential to answer research questions of this study. Therefore it can be argued that the socio-legal research methodology enables researchers to investigate issues that ‘neither law nor sociology alone can grasp adequately’ and is the reason why recourse to both ‘forms of knowledge’ is crucial.852

(b) Mixed Methods: Triangulation

Another aspect of and justification for the use of multiple research methods is that it increases the validity of collected data and derived findings,853 as the ‘thoughtful use of mixed methods can capitalise on the strengths and defuse the weaknesses of each method’.854 Every research method has a different line of sight directed toward the same point. Therefore, each method reveals slightly different facets of the same reality, but a combination of multiple methods or mixed methods provides a better picture of studied area. According to Bruce Berg:

By combining several lines of sight or methods, researchers obtain a better, more substantive picture of reality; a richer, more complete array of symbols

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851 Nielsen, above n 844, 972.
853 Patton, Qualitative Evaluation and Research Methods, above n 840, 245.
and theoretical concepts; and a means of verifying many of these elements. The use of multiple lines of sight or methods is called ‘triangulation’.855

Triangulation or establishing reality via a mixed method approach allows a better understanding of the research phenomenon. In this regard, Danzin and Lincoln highlighted that such use ‘reflects an attempt to secure an in-depth understanding of the phenomenon in question’.856 Denzin also outlined that triangulation has several elements: data, investigator, theory and can comprise two types of methodological triangulation.857 Both within-method and between-method triangulation858 has been applied in this research. The usual justification for combining together different research methods (that is, a multi-method approach) or mixed methods is that it provides a greater richness of data as well as increased validity of the results.859 The latter is largely due to the weaknesses of each single method being offset by the other,860 as each approach has its own philosophical standpoint that guides the research questions and the procedure to be used for data collection and analysis. In this study both qualitative and quantitative research methodologies have also been applied. The combination of qualitative and quantitative data sets is a good idea and both methods are combined together to obtain a comprehensive understanding of the research topic.861 Initially, this study assumed a qualitative (case study and semi-structured interview) research approach. Then, a quantitative method (via survey) was added to elaborate and to refine the qualitative results. A mixed method or combined approach of qualitative (case study and interview) and quantitative (survey) strategies were used to explore the objectives of this research, increase the

856 Norman K Denzin and Yvonna S Lincoln, ‘Introduction: Entering the Field of Qualitative Research’ in Norman K Denzin and Yvonna S Lincoln (eds), Handbook of Qualitative Research (Sage Publications, 1994) 1, 2.
858 ‘Methodological Triangulation entails within-method triangulation and between method triangulation’ and represents a facet of the multiple method approach. See ibid.
861 Toni Tripp-Reimer, ‘Combining Qualitative and Quantitative Methodologies’ in Madeleine Leininger (ed), Qualitative Research Methods in Nursing (Grune and Stratton, 1985) 179, 180.
validity of the collected data and answer all the research questions. As Kaplan and Duchon has pointed out:

> Collection different kinds of data by different methods from different sources provide a wider range of coverage that may result in a fuller picture of the unit under study … 862

(c) Empirical Analysis of Case study

Qualitative research involves the collection of a variety of empirical materials via such methods as case studies, interviews and so on.863 Therefore two case studies864 have also been selected, and some data have been collected and analysed applying this empirical form of inquiry.865 The use of the empirical method in the legal arena is now very common and ‘draws on a range of social research methodologies combining socio-legal research methods’.866 The empirical analysis of case studies is one of the significant strategies for this research project. Qualitative research through ‘case studies’ has been conducted both in the National DNA Database (hereinafter referred to as the NDNAD) of the UK and the National Forensic DNA Profiling Laboratory (hereinafter referred to as the NFDPL) of Bangladesh and this has enabled the researcher to better understand factors that influence issues related to this study. It also provides up-to-date information about human rights and privacy issues in the selected countries and the existing scenario of these countries. As part of this process, semi-structured interviews and a survey have also been conducted with the staff of the NFDPL, Bangladesh. In addition, while exploring the developing countries’ context (particularly the gap between developed and developing countries in the use of DNA data for civil and criminal case investigative processes), it seemed that both case studies and semi-structured interviews were much better tools for provoking discussion. This stage can be referred as ‘data collection stage’ (see Figure 2 and Figure 3).

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862 Bonnie Kaplan and Dennis Duchon, 'Combining Qualitative and Quantitative Methods in Information Systems Research: A Case Study' (1988) 12(4) MIS Quarterly 571, 575. Note: MIS Quarterly is a journal produced by the Management Information Systems Center of the University of Minnesota (USA).
863 For further details about ‘qualitative research method’ see Section 4.1.3 of this Chapter. See also Denzin and Lincoln, ‘Introduction’, above n 856, 4.
864 For further details about ‘case studies’ see sub-section 4.1.3.1 of this Chapter.
(d) Analysis of Literature and Legislation

An initial systematic literature review was essential for the conceptualisation of important issues related to human rights and privacy as well as for the comparative analysis between developed and developing countries. It is also significant in the examination of existing thinking and established rules in this area. Therefore, considering the value of the proper use of genetic information in the justice delivery system, and the urgency for its legal basis, this research project has begun with analysing legislative and judicial materials and subsequently other literature. The drawbacks and shortcomings of existing legislation, judicial decisions and other literature governing the forensic use of DNA information issues has been identified and analysed with a view to striking a proper balance between two conflicting interests (namely human rights and privacy vis a vis state security issues). This approach also helped the author to understand the current legislative development scenario of human rights as well as privacy (including genetic privacy), and the ongoing debates in this area.

At first, a range of international instruments, such as conventions, declarations and resolutions, was analysed. Then the study focused on the relevant national laws in the UK and Bangladesh, where appropriate. The jurisdictions of the UK and Bangladesh have been chosen for a number of reasons. Primarily, since challenges with regard to forensic use of genetic information are global in nature, the matter needs to be addressed globally, and an international perspective should include the concerns and findings from both developed and developing countries. Snapshots of what is happening in the developed and developing countries sampled have helped to construct an overall picture that has facilitated this study to address the issues globally. Only two jurisdictions have been selected to allow for a range of in-depth and rigorous analysis, rather than a more superficial overview of a number of different jurisdictions.

Nevertheless, national legislation and case law from other regulatory regimes have also been examined. An examination of the experiences of developed countries is very useful for developing countries. Although ideas and laws from such developed sources are not readily applicable, they will gradually come to benefit the developing
countries according to their needs. It is to be noted that all of these jurisdictions are not referred to in each of the issues of this study. Instead, they are referred to selectively depending on their relevance. Another important source of information are the reports created by and/or addressed to a range of governments or organisations together with the selected countries. In the UK and Bangladesh, the relevant organisations are the NDNAD and the NFDPL, respectively. In addition, some other relevant literature has also been reviewed.

4.1.3 QUALITATIVE METHOD

‘The expression qualitative research,867 in its most general sense, refers to collecting and interpreting information about some phenomena without concern for quantities’.868 With this method, the focus is on identifying the qualitative features, characteristics, or attributes that make the phenomenon what it is.869 Qualitative research ‘stress[es] the socially constructed nature of reality, the intimate relationship between the researcher and what is studied as well as the situational constraints that shape inquiry’.870 It is one of the most established research methods in the area of socio-legal research. Some of its common features871 are identified by Uwe Flick:

Qualitative research is intended to approach the world ‘out there’ (not in specialised research settings such as laboratories and to understand, describe and sometimes explain social phenomena ‘from the inside’ in a number of different ways: (i) by analysing experiences of individuals or groups … (ii) by analysing interactions and communications in the making … by analysing

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867 About the historicial context of the qualitative research, Denzin and Lincoln have stated that: Qualitative research has a long distinguished history in the human disciplines. ‘In sociology, the work of the “Chicago school” in the 1920s and 1930s established the importance of qualitative research for the study of human group life.


868 R Murray Thomas, Blending Qualitative and Quantitative Research Methods in Theses and Dissertations (Corwin Press, 2003) 33; Denzin and Lincoln identified that ‘The word qualitative implies an emphasis on processes and meanings that are not rigorously examined, or measured …, in terms of quantity, amount, intensity, or frequency’: Norman K Denzin and Yvonna S Lincoln, ‘Introduction: Entering the Field of Qualitative Research’ in Norman K Denzin and Yvonna S Lincoln (eds), Collecting and Interpreting Qualitative Materials (Sage Publications, 1998) 1, 8.

869 Madeleine Leininger, ‘Nature, Rationale, and Importance of Qualitative Research Methods in Nursing’ in Madeleine M Leininger (ed), Qualitative Research Methods in Nursing (Grune and Stratton, 1985) 1, 5.


documents (texts, images, films or music) or similar traces of experiences or interactions.\textsuperscript{872}

Patton further argued that:

A qualitative inquiry strategy emphasises and builds on several interconnected themes: (i) naturalistic inquiry; (ii) inductive analysis; (iii) holistic perspective; (iv) qualitative data; (v) personal contact and insight; (vi) dynamic System; (vii) unique case orientation; (viii) context sensitivity; (ix) empathic neutrality; (x) design flexibility.\textsuperscript{873}

Many methods and approaches are applied in qualitative research, such as case study, interview, personal experience, introspective, life story, participant observation, historical, interactional, examination of artefacts (including documents) and visual texts — all of which contribute to a description of routine and problematic moments and meanings in individual lives.\textsuperscript{874}

This method, therefore, explores attitudes, behaviour and experiences and also attempts to get an in-depth opinion from participants.\textsuperscript{875} Consequently, the qualitative research method provides the researcher with multiple choices and means to explore the depth, richness, and complexity inherent in the phenomena being studied.\textsuperscript{876} Empirical research for this project is conducted in two instances: one is ‘case study’ and another is ‘semi-structured interview’. Later interview data are further explored and analysed applying ‘constant comparative method of grounded theory (hereinafter referred to as the GT)’.

Next section is going to discuss about case study method:

\textsuperscript{872} Uwe Flick and Graham R Gibbs, ‘Analyzing Qualitative Data’ in Uwe Flick (ed), Sage \textit{Qualitative Research Kit} (Sage Publications, 2007) vol G, x.
\textsuperscript{873} Patton, \textit{Qualitative Evaluation and Research Methods}, above n 840, 40–1.
4.1.3.1 Case Studies

The use of case studies has become extremely widespread in small scale social research.877 The ‘case study’ is one of the important forms of empirical inquiry878 and a most common way to undertake qualitative research.879 Stake observes that ‘[a] case study draws attention to the question of what specially can be learned from the single case’ and adds that it is also ‘both a process of inquiry about a case and the product of that inquiry’.880 A case study can focus on various subjects or phenomena, including ‘individuals, programs, institutions, or groups’.881 According to Bouma, a case study may be of one person, group, classroom, town, or nation.882 The case study approach is particularly appropriate for individual researchers because it gives an opportunity for one aspect of a problem to be studied in some depth within a limited time scale, though there are some exceptions.883 Further, the methods of qualitative case study offer a means of ‘disciplining personal and particularised experience’,884 while offering ‘a richness and depth of information not usually offered by other methods’.885 According to Robert K Yin:

[C]ase studies are the preferred strategy when, “how” or “why” questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context.886

Yin notes that the case study offers researchers particular advantages as ‘an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly

881 Thomas, above n 868, 33. See also Denscombe, The Good Research Guide, above n 877, 33; Patton, Qualitative Evaluation and Research Methods, above n 840, 384.
884 Stake, ‘Case Studies’, above n 879, 443, 460.
885 Beverley Hancock, ‘Trent Focus for Research and Development in Primary Health Care: An Introduction to Qualitative Research’ (Trent Focus Group, 1988) 6.
886 Yin, above n 878, 1.
Four elements typify case studies: context, boundaries, time and intensity.

The empirical section of this thesis reveals what happens in practice rather than in theory. Two case studies are undertaken, each of a different human DNA service system which are themselves selected to illustrate what occurs in developed and developing countries — one from the UK (as a model of a developed world approach) and another from Bangladesh (as an example of a developing country approach). Case studies can focus on a single case as the unit of analysis or on multiple cases that are then compared. A comparative case studies approach provides an opportunity to review two different styles regarding the forensic use of DNA information both in the UK and Bangladesh (as developed and developing countries respectively).

(a) Case Study 1
The first case study has been conducted in the National DNA Database of the UK (England and Wales) (that is the NDNAD). In this case study, the main sources of information were published books, journal articles, other published documents, legislations, case laws and so on. Although the case study is one of the important forms of empirical inquiry, sometimes empirical data collection, for example, through person to person interview with human data subject requires ethics approval and informed consent. Due to this intricate process at times this is not laudable to conduct two case studies in one research project. Specially, if the nature of the data to be collected is very sensitive and the project has a predefined time-limit, more than one extensive fieldwork may become really difficult. In such circumstances, alternatively, research outcome can be obtained from readily accessible existing data — that is to say, the secondary data. For this reason, ‘very often case studies are conducted depending on large volumes of readily-accessible, existing data’. There are instances ‘where case studies focus on examples of research uses data that were

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889 Ibid 360.
890 Comparative analysis is undertaken in Chapter 7 of this thesis.

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originally collected for another purpose (secondary use of data). Moreover, Stake (1995) and Yin (1994) identified at least six sources of evidence in case studies. Documents and archival records are two important sources in case studies.

The UK has been selected to represent the situation of developed countries. Moreover, the UK established the first forensic DNA database. This country has, therefore, made significant progress in managing forensic DNA information and database; however, there are still some inconsistencies in the current UK scenario which must be acknowledged before the problems can be properly addressed. For instance, very recently a significant case (the Marper case, of 2008) revealed violations of human rights and privacy in the UK jurisdiction. In their judgment, the European Court of Human Rights (ECtHR) decided that there is a clear violation of human rights and privacy in practices regarding the use and retention DNA samples in the NDNAD of the UK. In addition, the UK’s current legal provisions are not sufficiently consistent to ensure human rights and privacy in regards to the use of DNA information for case investigation purposes. Still there is some scattered evidence of the collection from and retention of DNA samples of innocent individuals by the UK police.

This case study on the NDNAD is, therefore, significant for this thesis as it will focus more on what happened in terms of UK policy and practice on human rights and privacy issues after the Marper judgment. This examination of UK legislation and policy as well as of the governance and practices of the NDNAD will increase understanding of the government’s reaction to the Marper judgment.

(b) Case Study 2
To balance the perspective of the operations of and the challenges to DNA data management in a developed country, the case study on Bangladesh provides a salient contrast as it illustrates existing scenarios and challenges faced by developing countries. The Bangladesh government has only comparatively recently established the NFDPL and begun to collect DNA information from suspects, victims and others.

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892 For further details see section 3.1.3.4 of Chapter 3 and section 5.1.6.2 (a) of Chapter 5.
893 For further details see Chapter 5.
in order to detect criminals and to identify missing persons. Although the mechanism has proved to be a very effective investigating tool for ensuring social harmony and justice, there are nevertheless some challenges involved in utilising this system. The NFDPL of Bangladesh lacks appropriate administrative and legislative mechanisms to protect privacy of data subjects and others and protect persons from misuse associated with such data. A comparison with what happens in the UK has usefully illuminated how this issue might be more effectively dealt with. As a result it was invaluable to compare the two different jurisdictions of the UK and Bangladesh to determine the real gap between the approaches to the use as well as misuse (such as human rights and privacy violations) of genetic information in both developed and developing countries.

Moreover, the scenarios of the UK and Bangladesh offer a snapshot of the problems and concerns which are currently encountered by various members of the world community. In addition, in order to understand the legal, administrative and management process as a whole, these DNA service systems are critically examined and analysed from different perspectives, for instance, how they collect and store DNA information, how they allow third parties to access such information and how much power law enforcement agencies have while collecting the data. But collecting, storing and accessing information is not the whole picture: how these systems are running in the existing legal paradigms both in the UK and Bangladesh is a central issue addressed by these case studies. Thus the use of this method in this research has helped to explore ‘people’s experiences and emotions’894, and certainly underscores why it has gained increased popularity and acceptance as a research tool.895

While conducting the second case study (that is, the case study on the NFDPL, Bangladesh), a significant discrepancy has been detected between the theory with regard to the forensic use of DNA information in the justice delivery system of Bangladesh and actual practices in this regard. Since it is fairly a new practice in Bangladesh, there is a serious shortage of archival sources of information. Therefore, this project — particularly for this case study — relied on primary data (collected via

894 Hennie Boeije, Analysis in Qualitative Research (Sage Publications, 2010) 33.
895 'Preface' in Mark Pogrebin (ed), Qualitative Approaches to Criminal Justice: Perspectives from the Field (Sage Publications, 2003) xi–xii.
semi structured interview). Moreover, a survey\textsuperscript{896} has been conducted with the same participants to refine the qualitative data and to establish research arguments. As a result, this part of this study has pursued two different approaches (namely semi-structured interviews and a survey) to gather research materials and to answer the research questions of the case study on NFDPL (Bangladesh).

4.1.3.2 Semi-Structured Interviews

A case study could be conducted by applying either an ‘umbrella’ strategy that combines a range of data (for example, interviews, documentary or historical analysis, survey), or an individual method.\textsuperscript{897} In this research, the first approach has been used. As a way of acquiring information, interviewing is one of the most common and a central element to qualitative methodology\textsuperscript{898} where we try to understand our fellow humans. With the interview, while few people generally take part in this research process, the contact with these people tends to last a lot longer.\textsuperscript{899} Interviewing includes a wide variety of forms and has a multiplicity of uses. The most common form of interviewing involves individual and face to face interchange. In this regards Marshall and Rossman argued that:

\begin{quotation}
One cannot understand human actions without understanding the meaning that participants attribute to those actions — their thoughts, feelings, beliefs, values and assumptive words; the researcher therefore, needs to understand the deeper perspectives captured through face-to-face interaction.\textsuperscript{900}
\end{quotation}

Interviews can be structured or semi-structured or unstructured.\textsuperscript{901} In this study, the semi-structured interviews (also known as the indepth interviews) were conducted at the first instance. Max Travers argued that the ‘indepth interview as a social research method, is developed from an interpretivist perspective that sees that social research needs to address the complex ways in which people understand their lives’.\textsuperscript{902}

\textsuperscript{896} For further details see section 4.1.4.1 of this Chapter.
\textsuperscript{897} Webley, above n 849, 939.
\textsuperscript{898} Katharyn Antle May, ‘Interview Techniques in Qualitative Research: Concerns and Challenges’ in Janice M Morse (ed), \textit{Qualitative Nursing Research: A Contemporary Dialogue} (Sage Publications, revised ed, 1991) 188, 188.
\textsuperscript{899} Dawson, above n 875.
\textsuperscript{900} Catherine Marshall and Gretchen B Rossman, \textit{Designing Qualitative Research} (Sage Publications, 3\textsuperscript{rd} ed, 1999) 57.
\textsuperscript{901} Andrea Fontana and James H Frey, ‘The Interview: From Neutral Stance to Political Involvement’ in Norman K Denzin and Yvonna S Lincoln (eds), \textit{The Sage Handbook of Qualitative Research} (Sage Publications, 3\textsuperscript{rd} ed, 2005) 695, 698.
\textsuperscript{902} Max Travers, ‘Qualitative Interviewing Methods’ in Maggie Walter (ed), \textit{Social Research Methods an Australian Perspective} (Oxford University Press, 2006) 83, 86.
Interviews are more formal than a ‘conversation’, and involve a set of assumptions or presuppositions and understandings ‘which are not normally associated with a casual conversation’. The topic is predetermined by the interviewer to a great extent, and the direction of the interview and information obtained usually set by the questions posed. Open-ended questions can elicit far greater information and at times unexpected responses that add to the richness of the data collected and the comprehensiveness and veracity of the scenario revealed. In other words, the interview is seen as a potential mechanism for the exploration of research questions, collection of relevant data and to answer those research questions. It also ‘provides maximum opportunity for complete and accurate communication of ideas between the researcher and the respondent’. Therefore, the purpose of collecting empirical data from the NFDPL, Bangladesh (via semi-structured interviews) is to gather necessary information on what is happening in practice apart from what exists in theory. The data collected were supportive of the arguments of this research, enabling the researcher to verify already established opinions and also to predict future trends.

The interview structure used in this research is semi-structured in nature, which involves asking a set of pre-determined questions but questions that offer a degree of flexibility that is lacking in a totally standardised interview. The form lies ‘somewhere between the extremes of completely standardised and completely un-standardised interviewing structures’. In a semi-structured interview, the questions asked are generally put ‘to each interviewee in a systematic and consistent order, but the interviewers are allowed freedom to digress’. As Berg observes, ‘interviewers are permitted (in fact expected) to probe far beyond the answers [provided] to their prepared and standardised questions’. Therefore, the interviewees were asked some open-ended questions and were free to elaborate on their own thoughts and

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905 Interview Questions and transcripts are included in ‘Appendix A’.
906 Berg, above n 855, 70.
907 Ibid.
908 Ibid.
digress when they deemed it necessary. In response to those digressions, the researcher then adapted the questioning, in order to make the interviewees elaborate more on their views and ideas.

In order to gain a deeper insight about this research topic and also to increase the validity of the case study on NFDPL (Bangladesh), empirical data (via semi-structured interviews) from the managements and operational officers (scientific or administrative staff) of the NFDPL who deal with forensic use of DNA data were collected in August and September 2010. Data collected via interviews illustrated existing scenarios and challenges (including human rights and privacy issues) faced by Bangladesh. There is also a serious dearth of secondary sources of information. Therefore, the data collection in this study was highly significant. 9 participants were selected among those who volunteered from among 40 employees. Although this may appear to be a very small number from a quantitative point of view, the data collected nonetheless has strong validity because of the depth and detail gained through the adoption of the qualitative approach. It is argued that this number provides ample data to illustrate the process being researched. Some of them were very open and willing to engage in lively conversation about their perceptions and understandings. Each interview lasted between 30 and 45 minutes and a comfortable face to face encounter facilitated an exploration of responses on the current status of the NFDPL. The following section of this chapter details how the research was undertaken. Importantly, it provides descriptions of and justifications for key decisions in relation to the methods chosen, including the sampling technique, the structure and setting for the methods.

4.1.3.3 Data Collection Procedure and Ethical Considerations

Because the objects of inquiry in interviewing are people, extreme care must be taken to avoid any harm to them. Traditionally ethical concerns have revolved around the topics of informed consent, right to privacy, confidentiality and anonymity protection from harm, and securing the data. Ethical considerations are one of the important issues in research involving human beings. The following

909 Berg, above n 855, 53–60; see also, Fontana and Frey, above n 901, 715.
discussion outlines procedures and processes that were followed in the interview methods.

(a) Participant Recruitment

The NFDPL employees were recruited for this project with permission from the management of the NFDPL. Initially, the participants were contacted through the management, that is, the head of the NFDPL. A letter detailing the research objectives and significance of this project, its probable outcomes and the necessity for the interviews were sent to the management. The letter also described how the interview would be conducted and information used. Upon approval being obtained from the management, participants were contacted directly to explain the research project and given a ‘Participant’s Information Sheet’ to further explain the aims and benefits of the study. No third parties (for example, marketing research companies) were used. Interested participants were directed to contact the researcher in order to undertake the interview. Participants were selected on the basis of their interest to participate. Then the date, time and venue were fixed by the researcher according to the convenience of the participant concerned.

Two types of interviewees have been recruited, one group being from the management of the NFDPL (such as, the head or the senior officers) and the second group comprising scientific officers, or other administrative staff who directly handle collection, analysis and storage of DNA data. However, this group division is only for personal understanding and is not identifiable in any part of this research or any other publications. The adoption of a semi-structured interview technique with its inherent flexibility, was less intrusive and less intimidating than a formal interview and encouraged expansive two-way communication between interviewer and those who are interviewed. Open ended questions were used to try to develop an open ended discussion rather than create a more formal interview session. More scope was thus offered to the participants to share their views freely.

Sample Selection

There are around 40 members of staff at the NFDPL of Bangladesh. At least 2 management staff and 7 operational staff (scientific officers/administrative staff)
were selected from among those who were volunteered for the interviews. They were interviewed individually with no group sessions.

*Why NFDPL Employees*

It has been mentioned earlier that the practice of collection and use of DNA information in solving civil and criminal cases has only very recently been adopted in Bangladesh; however, there is not enough secondary sources of information with regard to this service. Collected empirical data (via interviews) with the participants (those who volunteered) has revealed the exact scenario of this newly emerging facility. The selected groups are currently working in NFDPL, either as operational or management staff, thus, they were able to give details about the existing situation in the laboratory.

*Outline for the Participants*

At the beginning of each session, participants were given a full explanation of what was expected during discussions. They were encouraged to freely participate in an open but mutually respectful manner. Each interview was recorded on audio tape, with the aim (as Cassandra Sharp so rightly observes) ‘not to capture the truth, but to assist the conversation — that is, in order to hear better what was discussed’. Participants self-selected, that is, they made themselves available on a voluntary basis. A copy of ‘Participation Information Sheet’ (PIS) was provided to them and these PIS were translated, where requested, and explained to their satisfaction. They were then allocated sufficient time to consult with their friends or family, where they felt necessary, before making any decision regarding their participation.

*Informed Participants*  
To be willing and comfortable to participate in the research, the participants obviously needed to be fully aware of the methods involved and of potential risks.

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911 Christians argued about informed consent which is ‘[c]onsistent with its commitment to individual autonomy, social science in the Mill and Weber tradition insist that research subjects [should] have the right to be informed about the nature and consequences of experiments in which they are involved’: Cliford G Christians, 'Ethics and Politics in Qualitative Research' in Denzin Norman K and Yvonna S Lincoln (eds), *The Sage Handbook of Qualitative Research* (Sage Publications, 3rd ed, 2005) 139, 144.
The following part outlines how the participants were fully informed of these aspects of the research.

**Risk:** Each interview lasted between 30 and 45 minutes; therefore; it has consumed some of their valuable time. There was some small risk or inconvenience for them. As some questions were related to their job and these could reveal some challenges that currently face by this laboratory, assurances were given that the privacy and confidentiality of all participants would be maintained and ensured all throughout this research. However, if anyone felt uncomfortable to answer any question, they were given opportunity to decide not to answer. Their co-workers knew that some of their colleagues were participating in this interview process, since permission was obtained from management beforehand; however, they did not know exactly who was participating and who was sharing what information. Each of the participants was interviewed separately so that their identity remained undisclosed to other participants.

**Consent:** The aims and objectives of the research and how the interview information was going to be used were adequately explained to the participants. This allowed them to properly understand the risks, and give informed consent to the interview. A copy of both the PIS (as referred to earlier) and a ‘Consent Form’ were provided to them. These documents were translated and explained to their satisfaction. Finally participants were requested to sign the consent form as part of this process.

**Withdrawal of Consent:** At the first meeting with participants, it was explained to them orally that their involvement in this research project is completely voluntary, and they were also informed that they had the right to withdraw their participation at any time before the publication of this thesis. The PIS includes an explanation of the participants’ freedom to discontinue participation. If discontinuation occurs, no data from that interviewee will be retained by the author. Also, there will be no adverse effects on participants for their withdrawal as participation is completely voluntary.
Among the 40 staff members of the laboratory, only 9 of them were selected from among those who volunteered. This was to the risk of their being identified within their laboratory and guarantee that their privacy and confidentiality are maintained. Participants contacted the author individually when a separate date and time were fixed for each interested participant. Their special needs and requests (which are vital with regard to their welfare) were maintained during the interview. Their consent form and interview questionnaire were completely de-identified so that they can no way be related to individual participants.

Data subjects are completely de-identified in the analysis stage so that no information can be linked with individual or group participants. Participants are cited with code numbers. A password protected computer was used for data analysis. Necessary measures were also taken to prevent physical (loss of hard drive) and or logical (virus attack) threats. At the final stage, a standard encryption method (adobe) was used to store the data. Other than the researcher and supervisor, no one has any access to this information.

Ethical Approval: Ethical approval for this study was obtained from the Human Research Ethics Committee (HREC) of the University of Wollongong.

4.1.3.4 Qualitative Data Analysis Strategy

According to Bogdan and Taylor, qualitative data analysis strategy ‘refers to a process which entails an effort to identify themes and to construct hypotheses (ideas) as they are suggested by data and an attempt to demonstrate support for those themes and hypotheses’. A qualitative researcher uses inductive analysis, which means that categories, themes, and patterns come from the data, that is, ‘[t]he categories that emerge from field notes, documents, and interviews are not imposed

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912 A ‘Code of Ethics insists on safeguards to protect people’s identities and those of the research locations. Confidentiality must be assured as the primary safeguards against unwanted exposure’: ibid 145.
913 A copy Ethical approval from the Human Research Ethics Committee (HREC) of the University of Wollongong has been attached as ‘Appendix C’.
prior to data collection’. The method tries to make sense of people’s experiences in a number of ways, for instance, phenomenology, ethnography, or grounded theory, life histories, and conversational analysis. In this study, constant comparative method of GT has been applied to analyse and develop a theory using interview data. The qualitative analysis of the interview data (a rich and fertile source of information) served to reveal the functioning of this laboratory, its existing scenarios and challenges. This collected data also helps to reveal human rights and privacy violations, as well as to enable the author to conduct a comparative analysis between developed and developing countries, that is, the current status of the NFDPL is compared with the NDNAD of the UK and some anomalies have been found between the theory and the practice within each jurisdiction and differences have also been found between these two forensic DNA database services as they operate in their respective justice delivery systems.

This part of the thesis, therefore, draws on and interprets this data to make some observations about the ways in which the existing scenario and challenges of the NFDPL has been examined, which also helps to reveal the gap between it and the NDNAD of the UK. To this end, the next section of this chapter prefaces the analysis with an explanation of the particular strategies used to analyse and interpret the data, and this analysed data has been discussed and applied in chapters 6 and 7. There were nine interview participants and these have been identified as ‘R1’, ‘R2’, ‘R3’, ‘R4’, ‘R5’, ‘R6’, ‘R7’, ‘R8’ and ‘R9’ in chapters 6 and 7. In this study the following process has been followed:

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(a) Interview Data Analysis

Having outlined in the previous part the methods for collecting this data, this part of the chapter seeks to outline the strategies adopted in analysing and interpreting it. Based on qualitative research methodology, the data collected via semi structured open-ended interviews were analysed using GT method. The GT method (that is, a

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916 Dona Rinaldi Carpenter, 'Grounded Theory as Method' in Helen J Streubert Speziale and Dona R Carpenter (eds), Qualitative Research in Nursing: Advancing the Humanistic Imperative (Lippincott Williams and Wilkins, 3rd ed, 2003) 107, 117.

constant comparative method of analysis) allows the depth of investigation needed to understand the experiences of staff members working at the NFDPL from their individual perspectives. This investigation has identified a core problem of the NFDPL. After constant comparative analysis of data, two core categories of problem have emerged — (i) ‘risks of human rights and privacy violations’ and (ii) ‘challenge of survival of the NFDPL’, that is the question of sustainably running of this laboratory in terms of human resources, financial and technological capacities as compared to the NDNAD of the UK (representing the discrepancy between the developed and developing countries). Therefore the application of this method allowed two main themes or concepts to be generated through interview data analysis. Data analysis in a constant comparative GT method occurs at four levels: ‘coding, constant comparison for inter-changeability of indicators, theoretical sampling (that is, data driven design) of core emergence and theoretical saturation’.918

The Grounded Theory (GT)

The GT approach is one of the important qualitative research methodologies that use a systematic set of procedures to develop an inductively derived theory about a phenomenon.919 The term ‘grounded theory’ refers to data grounded in fact and the generation of theory from data. Data are generally gathered using field techniques. Such a form of field research is grounded in semi-structured interviews, field work observations, case study documentation, or other forms of textual material.920 In this method, at no time does the investigator attempt to impose a theory from another study onto the collected or studied data. Rather when utilising the GT method, hypotheses are linked together so that the investigator is able to present an integrated theory to explain the problem being studied.921 The GT method therefore is intended

921 Phyllis Noerager Stern, 'Using Grounded Theory Method in Nursing Research' in Madeleine Leininger (ed), Qualitative Research Methods in Nursing (Grune and Stratton, 1985) 149, 150.
for developing theory that is ‘grounded in data which are systematically gathered and analysed through social research’.922

American sociologists Barney Glaser and Anselm Strauss923 developed GT methodology in 1967 at the University of California’s San Francisco School of Nursing as the theoretical framework for a study of staff management of dying patients. Their original GT research resulted in the publication of two classic books on the subject, namely ‘Awareness of Dying’924 and ‘Time for Dying’.925 The research also led to the publication of a book outlining the methodology used in this study.926 In attempts to provide more precise and rigorous refinements on the method, Glaser published ‘Theoretical Sensitivity’ in 1978. It was further expanded by Strauss.927 Again with former student and colleague Juliet Corbin, Strauss published ‘Basics of Qualitative Research’ in 1990.928 The work of grounded theory’s originators has evolved into different versions, which are referred to by some scholars as the Glaserian and the Straussian iterations.929 According to both Glaser and Strauss, however, a well-constructed GT methodology use normally meets four central criteria for judging the applicability of the theory to a phenomenon: fit, understanding, generality and control.930

**Justification for Application of GT**

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925 Ibid.

926 Barney G Glaser and Anselm L Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research* (Aldine Publishing, 1967), where Glaser and Strauss noted that ‘during 1960s sociological practice was almost exclusively reliant on quantitative methods (for example survey research) and that the status of qualitative methods was essentially at an all-time low’: see Pidgeon, above n 900, 76; see also Goulding, above n 922, 41.


929 Wilson and Hutchinson, above 923.

The goal of GT is the discovery and or construction of theory from methodical data generation\(^{931}\) that results in greater understanding of the phenomena being studied. In other words, the purpose of GT methods is, of course, to build theory that is faithful to and illuminates the area under study.\(^{932}\) According to Charmaz, ‘the power of grounded theory lies in its tool for understanding empirical worlds.’\(^{933}\) Chenitz and Swanson further stated that:

Grounded theory is a highly systematic research approach for the collection and analysis of qualitative data for the purpose of generating explanatory theory that furthers the understanding of social phenomena. The objective of grounded theory is the development of theory that explains basic patterns common in social life. Grounded theory represents an advance in technology for handling qualitative data gathered in the natural, every day world. It describes a method to study fundamental patterns known as basic social-psychological processes which account for variation in interaction around a phenomenon or problem.\(^ {934}\)

There are several reasons for applying GT method (that is constant comparative analysis) in this study:

\textit{Firstly}, GT is a widely used qualitative research methodology that aims to discover the social problems of selected groups in society as well as to discover processes to deal with these problems. Both problems and processes are examined coherently and consideration is given to the context and other aspects surrounding problems and processes. Because problems do not exist in isolation, so the conditions that co-exist with problems must also be identified and examined. The GT method, therefore, provides tools for analysing social problems and processes. It has the potential to expose basic social problems and processes\(^ {935}\) from the interview participants’ perspective, and also reveal how participants are accustomed to dealing with their central issues of concern.

\(^{931}\) Carpenter, above n 896, 108.
\(^{932}\) Strauss and Corbin, \textit{Basics of Qualitative Research}, above n 899.
\(^{933}\) Kathy Charmaz, ‘Grounded Theory: Objectivist and Constructivist Methods’ in Norman K Denzin and Yvonna S Lincoln (eds), \textit{Strategies of Qualitative Inquiry} (Sage Publications, 2\textsuperscript{nd} ed, 2003) 249, 250.
\(^{934}\) W Carole Chenitz and Janice M Swanson, ‘Qualitative Research Using Grounded Theory’ in W Carole Chenitz and Janice M Swanson (eds), \textit{From Practice to Grounded Theory: Qualitative Research in Nursing} (Addison-Wesley Publishing, 1986) 3, 3.
Secondly, in this study, the application of a newly emerged technology (that is, DNA profiling) in the society, its possible implications, and responses from a selected group are examined. Thus, GT is one of the most suitable options for this type of examination of data.

Thirdly, one of the major strengths of the GT method is that it provides tools that hold much potential for studying social justice issues, as this area is among many where researchers can fruitfully apply Glaser and Strauss’s GT methods. As Charmaz observes, the use of ‘GT tools for studying collective and individual action … can make social justice analysis more precise and predictive’, and ‘[b]y focusing on data gathering, the researcher can seek information to examine questions concerning equality, fairness, rights and legitimacy’. Moreover ‘social justice research often takes into account the historical evolution of the current situation, and a GT analysis of this evolution can yield new insights and perhaps alternative understandings’. This study deals with social justice issues (human rights and privacy violations; as well as gap between developed-developing countries while using DNA information in Bangladeshi justice delivery system), therefore the GT method has correctly been chosen for this study.

Finally, another main justification for applying this method is that there is a shortage of secondary source of materials (archival information) in relation to the NFDPL (Bangladesh). That indicates that there has been a lack of research on the NFDPL and on the use of its services in the justice delivery system in Bangladesh. More precisely, there is no adequate research or information regarding the use of DNA data in Bangladeshi justice system, neither in terms of the extent to which it is successful, or whether there is any challenges regarding the laboratory and so on. According to Chenitz and Swanson, the GT method has been reported by qualitative researchers as being appropriate and particularly useful in studying human behaviour.

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939 Ibid 513.
940 Published books, journal articles, reports, pieces of legislation, case law and so on.
and interaction in complex situations, especially those in which little work has been done previously.\footnote{Chenitz and Swanson, above n 934, 7.} GT theory again presents as the most appropriate methodology for this section of the research.

In order to answer research questions and also to undertake this case study, the researcher has pursued this qualitative data analysis method (that is, constant comparison) and the development of a substantive theory. Consequently, a part\footnote{For further details see Section 6.1.5 of Chapter 6.} of this study has been examined and analysed using the GT approach. In this regard to theory generation, Strauss and Corbin in their book ‘Grounded Theory in Practice’ highlighted that ‘GT methodology and methods (procedures) are now being the most influential and widely used modes of carrying out qualitative research, [especially] when generating theory is the researcher’s principal aim.’\footnote{Anselm Strauss and Juliet Corbin (ed), \textit{Grounded Theory in Practice} (Sage Publications, 1997) vii.} Therefore, this study meets the criteria espoused by the scholars in this field and in relation to the type of data being obtained. Since there has been little research in the areas of forensic use of DNA data in the Bangladeshi justice delivery system, GT method has the potential to detect human rights and privacy issues in Bangladesh as well as the gap between UK and Bangladesh in their use of forensic DNA data.

\textit{Grounded Theory Method: Constant Comparative Analysis}

A central feature of the GT approach is its being ‘a general method of [constant] comparative analysis’.\footnote{Glaser and Strauss, \textit{The Discovery of Grounded Theory}, above n 926, 1. See also Anselm Strauss and Juliet Corbin, ‘Grounded Theory Methodology: An Overview’ in Norman K Denzin and Yvonna S Lincoln (eds), \textit{Handbook of Qualitative Research} (Sage Publications, 1994) 273, 273.} The GT theorist’s ‘simultaneous involvement in data gathering and analysis is explicitly aimed towards developing theory’\footnote{Kathy Charmaz, ‘Grounded Theory’ in Sharlene Nagy Hesse-Biber and Patricia Leavy (eds), \textit{Approaches to Qualitative Research: A Reader on Theory and Practice} (Oxford University Press, 2004) 496, 503.} To do this, a GT theorist collects verbatim transcripts of interviews and reads through a small sample of text (usually line by line).\footnote{Gery W Ryan and H Russell Bernard, 'Data Management and Analysis Methods' in Norman K Denzin and Yvonna S Lincoln (eds), \textit{Collecting and Interpreting Qualitative Materials} (2\textsuperscript{nd} ed, 2003) 259, 279.} Sandelowski observes that the analysis of texts begins with proof reading the material and simply underlining key phrases
'because they make some as yet inchoate sense.' Then ‘[i]n a process called “open coding” the investigator identifies potential themes by pulling together real examples from the text’. Identifying the categories and terms used by participants themselves is called ‘in vivo coding’. Then, ‘[a]s coding categories emerge, the researcher links them together in theoretical models. One technique is to compare and contrast themes and concepts. When, why and under what conditions do these themes occur in the text?’ Glaser and Strauss refer to this as the ‘constant comparative method’. In other words, GT is a comparative method in which the researcher compares data with data, data with categories, and category with category. Data of a similar nature are moved into codes where they fit better, and in this way categories and sub-categories are constructed and altered. Glaser and Strauss nominate four stages for the constant comparative method or process:

Comparing Incidents Applicable to Each Category: This stage starts with the identifying categories and their properties from interview transcripts. Initially, in the open coding process, data are compared in terms of incident to incident and the process is completed by reading and comparing transcripts line by line. At this stage the researcher moves from ‘comparing incidents with incidents’ to ‘a comparison of incidents with properties’ and ‘in this way, incidents are compared only with the

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948 Ryan and Bernard, ‘Data Management and Analysis Methods’, above n 946.
949 Glaser, Theoretical Sensitivity, above n 935, 70; and Strauss, above n 927, 33, cited in Strauss and Corbin, Basics of Qualitative Research, above n 919, 69.
950 Ryan and Bernard, 'Data Management and Analysis Methods’, above n 946.
952 Charmaz, 'Grounded Theory in the 21st Century', above n 936, 517.
954 Glaser and Strauss, The Discovery of Grounded Theory, above n 926, 105.
955 Glaser and Strauss defined the term category as, ‘A category stands by itself as a conceptual element of the theory’, ibid. 36.
956 According to Glaser and Strauss, ‘a property is a conceptual aspect or element of a category’: ibid.
accumulated knowledge on a category’ in a process of constant comparison. In essence such constant comparison could be identified as the ‘meaning generating’ process, that is, the categories should not be merely labels used to name different incidents but are involved in the conceptualisation of some key features. They have to be analytical. Categories also have to be sensitising — that is, they must provide a ‘meaningful picture’. Both analytic and sensitised concepts ‘help the reader to see and hear vividly the people in the area under study’ and also help to ‘grasp theory developed for the area’.

Integrating Categories and Their Properties: After comparing incidents (above), in this stage ‘different categories and their properties tend to become integrated through constant comparisons that force the analyst to make some related theoretical sense of each comparison’. Researchers using this process are able to identify under which conditions particular incidents took place and in what contexts, and ‘[t]his integrative process [is] … supposed to reflect patterns of integration in the data itself (as generated through theoretical sampling)’ which had ‘provided the relevant data for revealing significant similarities and differences within and between categories’. This process — accompanied by memo writing and higher level conceptualisation — allows the substantive theory to develop.

Delimiting the Theory or Developing Core Category: At this stage, categories tend to collapse or integrate, and data are put back together (through constant comparison) which enables the theory or core category to emerge. As the main objective is to generate theory, but this is only possible ‘when an adequate theory has emerged from

957 Ibid.
959 Glaser and Strauss, The Discovery of Grounded Theory, above n 926, 38. See also Dey, above n 953.
961 Ibid 39. See also Dey, above n 953.
963 Ibid 109.
964 Dey, above n 953. See also Glaser and Strauss, The Discovery of Grounded Theory, above n 926, 109.

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the analysis,’ a point characterised by Glaser and Strauss as ‘theoretical saturation’, referring to concepts and not data, ‘and [identifying] ... a point where no further conceptualisation of data is required’. Dey has observed that it also marks a point where no further sampling is deemed to be required. The concepts or core categories will self-generate if the researcher adheres to this process and these will in turn lead to the emergence of theory. This is because in this process (constant comparison), categories become repetitive, incidents are cross coded, and categories are eventually collapsed or integrated.

Writing the Theory: At the end, it is by the process of constant comparison that GT method works to develop a theory that is suited to its intended purpose.

The application of this method culminated in the development of the major theme or substantive theory which is presented in Chapter 6 of this thesis.

The constant comparative method of analysis was diligently applied to this study. The first two steps (discussed above) remain important for the constant comparative method of analysis. The phenomena are continually compared for similarities and differences, as these may reveal a set of sub-categories of a given category, and they are also compared to other categories, and this process is continually repeated until new concepts or themes emerged. The author continually decided which category or property the phenomena being analysed belongs to, and then named this category. These two steps ensure the generation of categories and their properties from the data. Because the author becomes close to data and is engaged in all types of coding simultaneously, the first two steps of constant comparison are not as tedious

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966 Ian Dey defines ‘Theoretical saturation’ as ‘the (non) emergence of new properties, categories, or relationships’. He adds that, ‘[o]nce the data no longer offer any new distinctions of conceptual import, categories could be described as ‘saturated’ and no further evidence need be collected’: Dey, above n 953, 8. See also Glaser and Strauss, The Discovery of Grounded Theory, above n 926, 111.
967 Dey, above n 953, 8.
968 Ibid.
as it may seem at first. The process involves coding, comparison and grouping or uniting, labelling and categorising, further data collection and coding, recoding (where indicated), and continual testing of emerging hypotheses against the data as those hypotheses arise. In this way a structure is built up that gives order to the relationship between categories and leads to the development of an overarching theory.

4.1.3.5 Management of Data

This stage could be referred to as ‘data management stage’ (see Figure 2 and Figure 3). In this study, data management (coding) has been facilitated using Nvivo software version 8 allowing data storage, manipulation and retrieval (that is, to analyse interview data). The Nvivo program is recognised as leading Computer-Assisted Qualitative Data Analysis Software (CAQDAS)

CAQDAS has been used for qualitative data analysis in this project because it is believed that it improves the efficiency and accuracy of the qualitative analysis in comparison to manual methods. This software facilitates the location of information

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once it has been coded. This obviates the need to continually search back and forth through written documents for like information’.\textsuperscript{978} It has been observed that this also reduces human error and ‘arguably allows for a more accurate analysis of the data’.\textsuperscript{979} However, CAQDAS could be ‘characterised as software for data administration and archiving rather than a tool for data analysis’,\textsuperscript{980} as it is the researcher’s ability to accurately code material in a manner relevant to the research data and their willingness to recode or collapse categories as additional later categories emerge, that provides the foundation of any analysis. The system enhances research by its capacity to handle large quantities of information in a time effective manner. It adds and integrates documents into a database, which can include ‘research project outline, records of interviews, field notes, memos, other internal documents and [links] to external documents … [It then can] combine and compare data across these sets’.\textsuperscript{981} Its limitations, like those of many computer programs, can be those of the researcher. For example, inadequate observation or comprehension of the use of synonyms or substituted acronyms can result in inadequate initial coding that hampers any subsequent research. Wisely used, it is a most useful tool for research.

(a) Strategies Taken for Data Analysis: Coding Process

The process of analysing data collected in research is often referred to as ‘coding’.\textsuperscript{982} Three stages of coding or data analysis are involved in GT. These are ‘open coding’, ‘axial coding’ and ‘selective coding’.\textsuperscript{983} The ‘coding’ for this study is conducted using Nvivo Software. In Nvivo 8.0 these three stage of coding is actually done through free nodes and tree nodes and creating relationship among them. In constant comparative analysis a total of four main steps are followed for coding:

*Codes* (tags or labels for allocating identified ideas or concepts): identifying a passage of text in the document or transcript that exemplifies ideas or concepts;\textsuperscript{984}

\textsuperscript{978} Ross, above n 926, 132–3.
\textsuperscript{979} Ibid.
\textsuperscript{981} Ross, above n 976, 136.
\textsuperscript{982} Strauss and Corbin, *Basics of Qualitative Research*, above n 919, 61.
\textsuperscript{983} Ibid 58; see also Dey, above n 953, 259–61.
\textsuperscript{984} Wong, above n 975, 15, 20.
Concepts (open coding): after coding, assigning key passages into categories which represent ideas or concepts;\(^{985}\)

Categories (axial coding): filtering the list of categories, deleting or merging or integrating categories with similar concepts;

Theory (selective coding): identifying or focusing on the core categories or themes from which the theory will emerge.

The purpose of this section is, therefore, to show how the deployment of the chosen analytic methods would achieve the aim of this study and find answers to the research questions. It also underpins the analysis discussed in chapters 6 and 7. In terms of data analysis, as discussed above, following the constant comparative approach, the four steps or coding processes are used for the systematic analysis of data. The 4 stages involve interrogating data at progressively deeper, less abstract levels. They are discussed in far greater detail below with the four major steps broken down into a multitude of steps utilised in GT research in general and this research in particular, and with reference also being made to theory. The four general stages, however, are:

![Diagram of Coding Process for Constant Comparative Analysis]

Figure 4: Coding Process for Constant Comparative Analysis

Step 1: Transcription and Codes

Perhaps quite obviously the step prior to the analysis of data was to have the audio version of the discussions transcribed into written form. The author used an audio tape recorder and listened to each tape and played interviews line by line and transcribed each line. There were many times when tapes were repeatedly played to allow the author to transcribe the interviews verbatim. Once this was completed, the transcript was checked and cleaned by way of editing the manuscript for any typographical errors and inconsistency. Although it is impossible to fully avoid the loss of some meaning in the process of transcription, every effort was made to keep this to a minimum. Following completion of the verbatim transcription, each interview was printed and labelled with its own unique code. With the interviews transcripts in hand, the QSR Nvivo 8.0 software was then used and the author proceeded with the coding processes. Maintaining the richness of interviews data, these individual transcripts were imported into Nvivo 8.0 for reading, analysing and coding.

Coding the data is ‘the first major analytic phase of any research’.\(^{986}\) Codification is essential procedure in qualitative analysis\(^ {987}\) as it allows linking of different data segments to create conceptual categories of data that have common elements. The assigning of researcher’s observations as to categories is known as coding\(^ {988}\) which links the data segments to particular ideas or concepts.\(^ {989}\) Strauss defines coding simply as the ‘process of analysis of data’.\(^ {990}\) The first analytic step, therefore, was to repeatedly read the transcripts in their entirety and then highlight key passages or interesting points in the transcripts that corresponded with the initial research questions, both primary and secondary,\(^ {991}\) such highlighted material is also termed as

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\(^{987}\) Gibbs, above n 973, 57.

\(^{988}\) Emily Stier Adler and Roger Clark, \textit{An Invitation to Social Research: How It's Done} (Wadworth, Cengage Learning, 2011) 144.


\(^{990}\) Strauss and Corbin, \textit{Basics of Qualitative Research}, above n 919, 61.

\(^{991}\) As outlined in Chapter 1.
‘critical instances’. Finally, coding is the pivotal link between collecting data and developing an emergent theory to explain this data.

Step 2: Open Coding: Concept Formation

The second step was to ‘code’ the transcripts using particular coding categories that were generated through a prolonged engagement with the data. This stage, termed as ‘open coding’ which means to assign the quotes (responses from the participants) or key passages (which is collected from the transcript) to categories (see Appendix B). Strauss and Corbin defined the term:

Open coding [as] the process of breaking down, examining, comparing, conceptualising and categorising data. [In a further clarification it is defined as] the part of analysis that pertains specifically to the naming and categorising of phenomena through close examination of data.

According to Gibbs, open coding is used to ‘examine the text for salient categories of information (nodes) by making comparison and asking questions.’ This is the first basic analytic step from which everything else follows. In this study the author has used Nvivo 8.0 software for ‘open coding’. Though the GT theory prefers three types of coding (open, axial and selective coding), the application of Nvivo 8.0 actually covers ‘open coding’ in its free nodes areas. These steps of analysis are explained thoroughly in the following discussion. All interview transcripts are gathered or imported into Nvivo version 8.0 as a preparatory step for open coding. All preliminary ideas or key words were fed into Nvivo 8 as ‘free nodes’. Free nodes represent unstructured, emergent ideas, an essentially non-hierarchical collection of

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992 According to Louise Plewes, ‘Critical instances exclude things like digressions, repetitions and other irrelevant material, but in practice their definition is subjective’: Louise Plewes, ‘A grounded Theory Approach to Analysis of Interview Data from UCLS's TQEF "Learning Resources" Project' (CHERI Seminar on Qualitative Research, 1 February 2002).

993 Charmaz, ‘Grounded Theory’, above n 933, 506.

994 Coding included mainly the transcripts of interviews and to a lesser degree other forms of communications with participants such as e-mail and informal discussion, as well as observations written down in the field, and the researcher’s thoughts.

995 Strauss and Corbin, Basics of Qualitative Research, above n 919, 61–2. See also Dey, above n 953, 97.

996 Gibbs, above n 973, 167.

997 Dey, above n 953, 97.

998 ‘A “node” is a way of connecting a theoretical concept or idea with passages of text that in some way exemplify that idea. The name is actually just shorthanded for an idea or concept that the passages share. The node in Nvivo is therefore the focus of a lot of the analytical thinking that goes on in qualitative analysis’: for further details see Gibbs, above n 973, 57–8.
nodes. Then the transcript of each interview was checked in order to identify the key words or critical instances. These key words or sentences reveal the trends of the answers to the interview questions. Subsequently, as shown in Figure 5, open coding interpreted as free nodes, were extracted from the nine interview transcripts. Not all questions were directly answered by the interviewees; rather their responses were like a thorough story or discussion, so there was an ample quantity of data with a variety of free nodes.

Data are examined and re-examined and the dialogue was broken down into lines, and then incidents are coded depending upon what seemed to be occurring in each incident. Open coding requires that the author identify what is happening in the data. In that situation, the researcher had to decide how each incident would be labelled. Later on the author asked herself ‘what category or property of a category does this incident indicate?’ By asking these questions and seeking answers from the data, open coding remained grounded and relevant concepts were emergent in the data from the participants’ perspectives.

Figure 5: Open Coding Interpreted in Free Nodes

Following the analysis of the first transcript, the remaining eight transcripts were dealt with in the same way. Specifically, each new piece of data was examined and broken down into concepts. Similar concepts were coded together and in this way

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999 Bazeley, above n 974, 32, 83. See also Lyn Richards, above n 973, 57–8.
1000 Glaser, Basics of Grounded Theory Analysis, above n 70, 39.
each piece of data was compared with data already labelled or coded. When
dissimilar data were identified, a new category was initiated accompanied by a
headline and an explanatory memo. It was also necessary to immerse oneself in the
data, to read it, think about it and try to put oneself in the position of NFDPL staff.
Eventually all incidents from all nine interview transcripts were examined, compared
and coded for both similarities and differences. In the whole process the author was
remained aware of not being biased or influenced by her own preconceived ideas.

Many categories have been identified from the first transcript and then progressively
fewer new categories from each successive transcript, as the proportion of new
information decreases. The process of assigning quotations to categories was
repeated for one transcript by a second, independent person to check the
reproducibility of assigning quotes to categories. This ensures mutual consistency
and credibility. This is a time-consuming stage which involves working through each
of the transcripts in turn to collect numerous quotes and examples of each existing
category and to identify new ones. The end point of this process is the production of
an initial list of categories. Seventy-one incidents or initial list of categories were
identified in the open coding stage.1001

Step 3: Axial or Theoretical Coding: Categories
The comparison of many coded incidents allowed the author to look for and identify
patterns. This patterning could, for example, be related to possible causes of events,
behaviours, actions, contexts, interactional strategies, or even outcomes.1002 Glaser
encourages all similar patterns to be grouped and named conceptually as a
‘category’.1003 As Strauss and Corbin observe, ‘[o]pen coding … fractures the data
and allows one to identify some categories, their properties, and dimensional
locations. Axial coding puts those data back together in new ways by making
connections between a category and its sub-categories’.1004 Therefore after open
coding, the next step was to relate the categories to one another and identify different
levels of importance; this process of analysis is called ‘axial coding’ or ‘theoretical
coding’. Though this stage was not followed by Glaser, Strauss and Corbin preferred

1001 All the free nodes are given in ‘Appendix B’.
1002 Strauss and Corbin, Basics of Qualitative Research, above n 919, 97.
1003 Glaser, Basics of Grounded Theory Analysis, above n 70, 40.
1004 Strauss and Corbin, Basics of Qualitative Research, above n 919, 97.
axial coding,\textsuperscript{1005} which they defined as ‘a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories’.\textsuperscript{1006} It involves refining the initial list of categories (which has been developed through the process of open coding) by deleting or combining some categories. At this stage, the initial list of categories is also cleansed by defining properties (such as context and preconditions) and making connections between categories. Categories have major or minor status and the linkages go across these different levels. The GT process of constant comparison assists the author in ‘theoretical or axial coding’ and facilitates more abstract or conceptual ways of looking at and linking the data. Like concepts are grouped together for a category, and individual categories, like all others, contribute to the developing theory. Although the actual management of data coding was assisted by computer software, it was the author who had to make sense of the cumulative data and interpret what was happening.

Interpretation or categorisation is done by extracting the tree nodes from the free nodes and regrouping them with each other into node sets in the Nvivo 8.0. ‘Axial and Selective coding’ are interpreted as tree nodes (see Figure 6). Tree nodes resulted from moving free nodes into hierarchies by shifting them from a general category at the top to more specific categories down near the bottom.\textsuperscript{1007} Categories can be named in two ways: first, the researcher can use \textit{in vivo} words (that is, the exact words used by the participants)\textsuperscript{1008} or words that ‘have been abstracted from the language of the research situation’.\textsuperscript{1009} In this research the author named the category applying both ways while coding interview transcripts into free nodes and tree nodes. The significant point is that category names were sensitising and meaningful and provide a bridge between the theoretical thinking (of the author) and the practical thinking of people concerned with substantive area.\textsuperscript{1010} After refining and combing all initial categories, 14 new categories have been developed.\textsuperscript{1011}

\textsuperscript{1005} Webley, above n 849, 930.
\textsuperscript{1006} Strauss and Corbin, \textit{Basics of Qualitative Research}, above n 919, 96.
\textsuperscript{1007} Bazeley, above n 974, 69, 83; see also Lyn Richards, above n 973, 57–8.
\textsuperscript{1008} Glaser and Strauss, \textit{The Discovery of Grounded Theory}, above n 926, 107.
\textsuperscript{1009} Ibid.
\textsuperscript{1010} Ibid 241.
\textsuperscript{1011} For tree nodes and sub-tree nodes see ‘Appendix B’.
**Step 4: Selective Coding: Theory**

The final stage is ‘selective coding’ and it involves the identification of a core category or general themes from which the theory arises. Strauss and Corbin defined Selective coding as:

> [t]he process of selecting the core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development.1012

Selective coding begins when the author moves from running the data open, to delimiting the coding process around a core category.1013 Selective coding is the strategy used to code for the core concept. As data chunks were being coded and questions asked and hypotheses constructed, the author began to see linkages between larger codes.

![Figure 6: Axial and selective Coding Interpreted in Tree Nodes](image)

For instance, the category of ‘lack of legislation or policies’ has given rise to issues such as ‘informed consent’, ‘involvement and skill and power of police’, DNA laboratory access by police and third parties, and equal treatment of child and adults DNA samples. Again the ‘collection of DNA samples and personal information’ and ‘retention of DNA samples and profiles’ categories have also given rise some societal concerns (for example, in relation to possible stigmatisation). So these

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categories have linkages between themselves. Each and every category individually and jointly is contributing to violations of human rights and privacy. Finally, all these categories are leading towards one of the core categories: ‘violation of human rights and privacy’. In this way, in selective coding all categories were examined and links were created to each other and finally, to the core concept. Similarly, a second core category or concept was identified by the author, namely the ‘gap between the UK and Bangladesh in regard to using and managing DNA facilities in their respective justice delivery systems’. In this process, memos were written to keep track of how each code linked to other codes or related issues.

The advantage of selective coding is that the author may focus on the analysis of one core category in detail (including consequences related to it) but still within the total context which was developed during open coding. The result of selective coding was two core categories or themes. These two core categories are categorised in the tree nodes that resulted from the open coding or free nodes in the previous stage. Using Nvivo 8, selective coding was interpreted in the ‘tree nodes’ areas. It includes human rights and privacy violations and the gap between developed-developing countries.

(b) Memo

Memo writing is the intermediate step between coding and the first draft of the completed analysis. Recording and writing memos on the researcher’s ideas is one of the important rules of the constant comparative method and it also useful for generating theory. Moreover memo writing helps to identify properties or characteristics of categories, look for its underlying assumptions, and show how and when the category develops and changes. Many qualitative researchers who do not write memos become lost in mountains of data and cannot make sense of them. Throughout all phases of this study the author has maintained memos. In the GT method, memo writing starts at the very beginning of the research process and is

1014 For further details see Appendix B.
1016 The detail has been given in Figure 13 and Figure 15 of Chapter 6.
1018 Charmaz, ‘Grounded Theory’, above n 935, 511.
continuous throughout the study until final writing. As suggested by Glaser and Strauss, it is these memos that inform the author. For example, memos related to coding will help recall the reasons for certain codes being constructed and others being collapsed. Additionally, memo writing assists the researcher to justify and clarify coding decisions. Memo construction occurred simultaneous to coding.

(c) Research Findings: Writing the Theory
When core categories are found and no new codes or concepts are able to be developed and the author was sure the human rights and privacy issues as well as the comparative analysis between UK and Bangladesh with regard to the use of DNA information has been identified correctly, it was time to present the data in terms of a substantive theory. Although much writing related to codes had occurred throughout this study, writing the theory or details about research findings has been added in the Chapter 6 of this thesis and it worked into the conclusion of the case study on the Bangladeshi DNA service system. As with all qualitative studies, the author has used verbatim quotes from the interviewees with the aim of adding richness and thickness to the study. All interviewees have been identified by code numbers.

4.1.4 QUANTITATIVE APPROACH
As Muijs observes, ‘Quantitative research is essentially about collecting numerical data to explain a particular phenomenon’ and such ‘research emphasise[s] casual relationships between variables, not processes’. Moreover, in this research approach an experimental design is established where dependable variables are measured. Carr defined the quantitative research approach as:

[A]n objective, formal, systematic process in which numerical data are used to quantify or measure phenomena and produce findings… [this methodology] test[s] theory deductively from existing knowledge, through developing hypothesised relationships and proposed outcomes for study.

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1019 Strauss and Corbin, Basics of Qualitative Research, above n 919, 198–9.
1020 For further details see Chapter 6.
Qualitative data is very often used as an important precursor to quantitative studies.\(^{1025}\) The use of qualitative data generally develops a close personal relationship with participants or subjects. This intimacy increases the willingness of research participants or respondents to participate in subsequent studies involving quantitative questions. In this regards Uwe Flick argued for ‘triangulation of qualitative and quantitative research’:

> [Where] different methodological perspectives complement each other in the study of an issue and this is conceived as the complementary compensation of the weaknesses and blind the spots of each single method. …. qualitative and quantitative methods should be viewed as complementary rather than as rival camps ... \(^{1026}\)

Ridenour and Newman identified this process as a ‘qualitative-quantitative interactive continuum’ closing the gap between these two methods.\(^{1027}\) In this study, the quantitative method has been applied in order to prove or support the findings found from the qualitative data analysis. In other words, a survey is conducted to support the results of the qualitative data analysis. Quantitative method also helped to conciliate the limitations that naturally result from the use of qualitative method. Qualitative data also provide a generalised background for interpreting later statistical results. The statistical results are then compared with the qualitative data to discern if there is a fit between two data sets. This method has also been applied to elaborate and refine the qualitative analysis results. The final step of this research was, therefore, the application of quantitative survey instruments to test the relationship between the variables.

### 4.1.4.1 Survey Questionnaire

Survey methods involve gathering information about the current status of some ‘target variable’\(^{1028}\) within a particular ‘collectivity’,\(^{1029}\) then reporting a summary of the findings in a quantitative form.\(^{1030}\) ‘[su]veys are concerned with … demographic

1025 Chas Critcher, David Waddington and Bella Dicks, 'Qualitative Methods and Welfare Research' in Fiona Williams, Jennie Popay and Ann Oakley (eds), Welfare Research: A Critical Rreview (UCL Press, 1999) 73, 74.
1026 Jick (1983) 135, cited in Flick, An Introduction to Qualitative Research, above n 860.
1027 Ridenour and Newman, above n 1023, 20, 22.
1028 ‘Target variable is a specified characteristic of a group or collectively’: Thomas, above n 868, 41.
1029 ‘A collectively is a group of things of a specified kind that becomes the focus of a survey. Collectivitiies can be people, objects, places, institutions, events or time periods — or a combination of more than one of these variables’: Thomas, above n 868, 41–2.
1030 Ibid 41.
characteristics, the social environment, the activities, or the opinions and attitudes of some groups of people’. The survey method uses ‘[i]nformation … gathered by means of self-completed questionnaires’ with the aim of obtaining ‘answers to the same questions from a large number of individuals …’. This ‘enable[s] the researcher not only to describe but also to compare, to relate one characteristic to another and to demonstrate that certain features exist in certain categories’. ‘Causal relationships’, however, ‘can rarely be proved by survey methods. The main emphasis is on fact-finding’.

The questionnaire is one of most useful data gathering instruments utilised in survey methods. Questionnaires are normally used for collecting two principal types of information that respondents are equipped to furnish — facts and opinions. Moreover, ‘the questionnaire’s structure is selected in view of the respondents’ likely knowledge of the information sought ... and also [their] willingness to report such information in [this] form’. The next step is to specify how the data were gathered, that is the survey design and procedures:

### 4.1.4.2 Survey Questionnaire Design and Procedures

An important strength of questionnaires is that they enable the author to collect a wide variety of information from respondents’, particularly if the questions are in the form of multiple-choice, which allows people to express their opinions by merely making one or more items in a list of options. In addition, when multiple choice items are used, it is an easy task to classify answers and calculate their frequencies. The researcher need not be present at the time the information is provided, and data can be collected from people in distance places. Questionnaires can be administered by a number of methods, including by mail, personally administered (telephone or face to face) or conducted over the internet. The selection

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1032 Ibid 14.
1033 Ibid.
1034 Ibid.
1035 Ibid.
1036 Ibid.
1037 Ibid 66–7.
1038 Ibid 69.
of suitable methods depends on the cost, the time available, the characteristics of participants, and the expertise of the researcher.

In this study, the face to face personally administered survey approach was employed. Through the interview process, an intimate association was developed between the author and the research participants. This intimate association with the target population often results in an opportunity to achieve more reliable results when quantitative questions are asked. Therefore, after finishing the interview process, and when participants agreed, the questionnaire was distributed to them, and they were then asked to fill out and return it to the author.\(^\text{1039}\) Survey questionnaires are structured to cover mostly the same area with similar questions to those utilised in the face to face interviews. It also helped the author to seek some more information that is relevant for this research, but which the interviewees could not reveal during interview process. This data helped to review the accuracy of the interview data (whether the participants responses differ from their previous data or not). In this process, ethics approval has also been obtained and approval from the management of the NFDPL has also been obtained before commencing the survey.\(^\text{1040}\) While collecting the data via a questionnaire the following steps have been followed:

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure7.png}
\caption{Data Collection Steps for Survey}
\end{figure}

\(^{1039}\) Ibid 67–8.
\(^{1040}\) Copies of Approval letter for interview from the Human Research Ethics Committee (HREC) of the University of Wollongong has been attached in ‘Appendix C’.
4.1.4.3 Limitation and Justification of this Approach

One of the significant limitations for applying quantitative approach is that this study has only nine participants or variables. Among the 40 staff members of the NFDPL, only nine were selected among those who volunteered in order to maintain their privacy and confidentiality.\textsuperscript{1041} So, this is the maximum number of participants in the researcher’s chosen research area. This number is very small in terms of quantity and to prove or justify a research hypothesis applying quantitative method. Nevertheless, this study has been chosen and mixed methods (both qualitative and quantitative approach) applied to justify its arguments and answer the research questions. The result of quantitative data analysis has supported and further strengthened the findings of the qualitative data analysis of this research. In this regards, Kaplan and Duchon acknowledged that:

\begin{quote}
Combing qualitative and quantitative methods proved especially valuable. … Mixing methods can … lead to new insights and modes of analysis that are unlikely to occur if one method is used alone.\textsuperscript{1042}
\end{quote}

Therefore examining the research problem using multiple research approaches has allowed the author to develop more accurate explanations of the chosen research phenomenon.

4.1.4.4 Quantitative Data Analysis Approach

This section provides a description of how the quantitative data analysis was actually done. The quantitative analysis process has been given below:

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Quantitative_Data_Analysis_Steps.png}
\caption{Quantitative Data Analysis Steps}
\end{figure}

\textsuperscript{1041} For further details see Section 4.1.3.3 this Chapter.
\textsuperscript{1042} Kaplan and Duchon, above n 862, 582.
In this study, the ‘descriptive statistics’ method has been used for quantitative data analysis. Descriptive statistics provide simple summaries (what is or what the data shows) about the sample and the measures. After collecting the questionnaire from the participants, the author organised the scores through descriptive statistics. One of the most common procedures for organising a set of data is to place the score in a frequency distribution. This method allowed the author to see at a glance the entire sets of scores and therefore patterns in the data sets have been seen easily.

This study has only nine variables, that is, a small number for quantitative data, therefore simple statistical analysis —‘univariate statistical analysis’ (applying frequency distribution) — was suitable for this study. More precisely, this statistical analysis remains useful for describing the pattern of responses to discrete questions. The application of this simple statistics analysis of quantitative data has also provided a significant social insight. In relation to question structure and scale, multiple choice questions, Yes-No type of questions were posed to the participants. Questionnaires were distributed to nine participants and all of them have replied. A copy of the questionnaire has been attached as ‘Appendix D’. Frequency distribution is depicted for this study using a table, and the table represents the number of cases associated with each category. Frequency distributions also usually reveal the percentage of answers found in each category. In other words, this method provides information about the proportion of responses that fall into any one category, thereby allowing us to see more precisely exactly what share of cases is connected with different response options. The tables which show the frequency distributions referred to above accompany the relevant discussion issue by issue in section 6.4 of Chapter 6. The tables mainly display frequency distributions in regard

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1045 ‘A frequency distribution is an organised tabulation of the number of individuals located in each category on the scale of measurement’; Frederick J Gravetter and Larry B Wallnau, Essentials of Statistics for the Behavioral Sciences (Wadsworth, Cengage Learning, 7th ed, 2011) 36.

1046 Ibid.


1048 Ibid.
to the principal research questions on human rights and privacy issues, and show the gap between developed and developing countries.

This quantitative data analysis (frequency distribution) obtained the same results as the qualitative analysis which has been found utilising the GT, for the relevant research area, that is, human rights and privacy violations, and also the gap between the UK and Bangladeshi DNA facilities for their justice delivery systems. Data found from the quantitative analysis actually help the author to draw an accurate conclusion regarding the selected research questions of this thesis.

4.1.5 CONCLUSION

This chapter has described and justified the methodology used to test the research questions and examine problem areas. The chapter also justified the reason for the use of the socio-legal approach in this study. It further explained the reason for applying a combined approach of qualitative (case study, interview) and quantitative (face to face administered questionnaire) strategies to explore the objectives of this research. The process of the development and validation of the application of these methods and instruments was also provided. In order to answer research questions, this study has chosen two case studies: one from the UK (NDNAD) and another is from Bangladesh (NFDPL). These two case studies actually reveal the general trends in both developed and developing countries when introducing and using a new technology such as DNA profiling. It also helped to determine the scope of human rights and privacy violations when such sensitive data is being collected, stored and accessed. These case studies also revealed the gaps between developed and developing countries. Though the problems and issues differ from country to country, the results from these case studies at least help to get a basic idea about some common problems which all developed and developing countries may face in this situation.

Finally, it can be observed that case study 1 was mainly done based on the analysis of legislative and literature, while case study 2 was conducted applying social science research methods (quantitative and qualitative) to fill the gaps where archival sources of information were found to be inadequate in addressing the research
questions. The combination of the multi-disciplinary areas of study actually reduces the basic weakness of applying single method. Also this inter-disciplinary research approach needed to undertaken in order to cover some shortcoming the author’s chosen area. An accurate conclusion has been drawn based on the outcomes of socio-legal approach.
CHAPTER 5

5.1 NATIONAL DNA DATABASE (NDNAD) OF THE UK: THE CASE STUDY OF A DEVELOPED COUNTRY

5.1.1 INTRODUCTION

For a considerable period of time justice delivery systems across the world are looking for various applications of science and technology to assist in detecting and convicting criminals. It is undeniable that the ‘fight against crime’ — and ‘in particular against organised crime and terrorism’ (one of the biggest challenges for today’s world community) — ‘depends to a great extent on the use of modern scientific techniques of investigation and identification’. ¹⁰⁴⁹ DNA technology and its application in the forensic context are currently cited to support such a claim. The use of this technology has marked ‘an epochal change in the dynamics of ... justice systems throughout the world’. ¹⁰⁵⁰ Over the past few decades DNA profiling has been increasingly used in forensic analysis, and is now a vital part of the case investigation process. The introduction of DNA sample analysis to forensic science¹⁰⁵¹ and the creation of DNA databases have brought with it an increased scope and growing number of opportunities in the justice delivery system. For instance, a forensic DNA database increases the possibilities of identifying a suspect or the actual offender.¹⁰⁵²

Very recently, continuous and successive series of technological improvements of DNA profiling and also the innovative use of increasing quantities of DNA samples and profiles for various civil (identifying disaster victims or missing persons) and criminal investigative purposes have demanded the establishment and use of forensic DNA databases. In order to meet this need, various developed and developing countries around the world have already invested in creating, developing and equipping their forensic laboratories and databases. The intention is to efficiently

¹⁰⁴⁹ S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [105]; see also Vermeulen, above n 370.
¹⁰⁵¹ Martin, Schmitter and Schneider, above n 210, 227–9.
¹⁰⁵² Corte-Real, above n 394, S143.
process and compare the DNA samples whenever necessary in order to maintain law and order and to ensure justice.

This chapter examines the use of the National DNA Database (hereinafter referred to as the NDNAD) in the United Kingdom (UK, that is England and Wales) — the first case study of this research. At first it presents a general picture of the management and use of forensic DNA databases in the context of developed countries. It mainly examines the issues regarding human rights and the factors involved in genetic privacy violations that may occur during this process in the context of a developed country (that is, the UK). Section 5.1.4 highlights the constitutional history and human rights situation in the UK; and then sub-section 5.1.5 presents the NDNAD case study focusing on its background, nature, oversight, operation and management, and use as well as its legislative framework. The subsequent section summarises the NDNAD policies and operations regarding DNA sample collection, storage or retention, access and use. Sub-section 5.1.5.9 outlines the advantages of the NDNAD, while section 5.1.6 examines and analyses the challenges posed with regards to the access and forensic use of the NDNAD, particularly in regard to ‘human rights and privacy violations’. Finally, this chapter concludes with a brief discussion of how to address those challenges.

5.1.2 FORENSIC USE OF DNA INFORMATION: DEVELOPED COUNTRIES CONTEXT

The establishment and maintenance of a forensic DNA laboratory or database involves the collection and storage of samples from innocent individuals, victims, suspects or offenders, their analysis and retention of samples while simultaneously storing of the information derived from those samples in a numeric form on a computerised database, sometimes together with other information about the individuals concerned. The decision to undertake this exercise is highly influenced by different factors, including projected outlays, anticipated benefits (often requiring a detailed cost\textsuperscript{1053} and benefit\textsuperscript{1054} analysis, both in monetary and non-monetary

\textsuperscript{1053}‘Costs depend on a number of factors, such as methods and numbers of loci used for DNA analysis, and types and numbers of samples that needs be analysed’: Committee on DNA Technology in Forensic Science, above n 19, 117.

\textsuperscript{1054}‘Benefits depend on how much sample or profiles are loaded in the database and the likelihood and success of finding matches at the time of investigation’: ibid.
terms) and so on. Monetary factors or economic considerations (number of people, categories of persons to be included, storage methods, number of samples and the form in which they are preserved and many more issues) are some of the important factors to be considered when establishing a DNA database. Non-monetary costs include the risk of loss of privacy as well as the misuse of genetic information. By contrast, both monetary and non-monetary benefits include the more timely, and ultimately more cost-effective, detection of criminals and their conviction and the prevention of future crimes, not simply due to the removal of guilty persons from the streets but also due to the potential deterrence value of perceptions of an increased risk of detection. All these diverse elements cannot be weighed without considering the societal values. That means, before setting up a DNA laboratory or database, several social, economic and political factors, as well as the legislative frameworks need to be taken into consideration. In addition, the attitude of governments, political leaders, legislators and civil society is also an important factor that cannot be ignored due to its significant impact on this process (that is, the establishing and running of a forensic DNA database).

After considering all these above mentioned factors, many countries have established forensic DNA laboratories and databases to facilitate forensic investigations. In this regard, Kaye points out that ‘[a]s currently practiced in almost all jurisdictions, a sample of blood, saliva, or other tissue or fluids is collected from a convicted offender, a fraction is taken for analysis, and the remainder is preserved and stored.’ Moreover, the 2008 INTERPOL survey report noted that DNA technology has gained immense popularity worldwide, with about 56 countries from different regions having taken initiative for establishing forensic DNA databases, the nature of which depends on their capabilities. However, at a national level the projected benefits of DNA profiling have not materialised fully and equally in all

1055 Ibid 113.
1056 Ibid 117.
1057 Ibid.
1058 Ibid.
1061 See Thibedeau, above n 26.
countries. The INTERPOL survey analysis also highlighted that the trend to establish forensic DNA databases is greater in developed countries than in developing countries. In order to see the trends (that is, how far economic factors and technological developments influence the size, quality of services (including security mechanism and privacy protection), and to appreciate the nature of challenges databases face, this study has undertaken two case studies: one (the UK, here England and Wales) representing the developed countries, and the other Bangladesh, representing the developing countries.

5.1.3 A CASE STUDY ON NATIONAL DNA DATABASE (NDNAD) OF THE UK: A DEVELOPED COUNTRY

The UK NDNAD has been selected to represent the situation of a developed country considering the following factors:

- The recent judgment in the *Marper case* (2008) which has increased the significance of analysing the UK NDNAD and its impact on human rights and privacy.
- The NDNAD is one of the successful databases of recent times. The findings from this case study also used (together with those from the case study of the Bangladesh National DNA Profiling Laboratory (hereinafter referred to as the NFDPL) to determine the gaps between developed and developing countries. Of particular relevance is how far, and to what extent the databases differ. An analysis of its successes and challenges can determine whether it is a good model for other countries, especially for those in the developing world.
- It is essential to note that a study with regards to the impact of forensic use of DNA data and database in relation to human rights and privacy challenges would not be complete if it is limited to an examination of the NDNAD only and did not extend to an analysis of UK constitutional history and its human rights situation (that is, the UK’s relevant historical, economic and social factors). This is because the constitutional history and overall human rights situation have a vital impact on and contribute to the county’s justice delivery

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1062 INTERPOL DNA Unit, above n 66; see also ICPO-INTERPOL, ‘INTERPOL Global DNA Profiling Survey Results and Analysis 2008’, above n 66.
1063 For further details see Section 2.1.5 of Chapter 2.
system. Therefore, the next section of this chapter begins with a brief overview of the legal and political background of the UK, and subsequently describes and analyses the existing human rights situation of the UK.

5.1.4 ASSESSMENT OF THE NATURE OF THE CASE STUDY ON THE NDNAD

For the purpose of this research, nature of the case study is not similar to general type of case studies. Though this is a socio-legal research, some of the key discussions are focused on legal issues. Therefore analysis of various national and international instruments, legislations and case laws form significant part of this research. Moreover there are instances ‘where case studies focus on examples of research uses data that were originally collected for another purpose (secondary use of data)’.1064 In that case, case study was conducted based on secondary literature.1065 Such existing data are often found to be extremely useful for identifying and understanding the research questions, as well as for suggesting potential solutions’.1066

As a result, the first case study (the NDNAD, UK) mainly relies on existing UK legislations, case laws, relevant government documents and other archival sources of information including books, journal articles, websites and the like. Collected information was up-to-date and adequate enough to determine the current status and trend of the UK’s NDNAD.

5.1.5 A BRIEF IDEA ABOUT THE UK AND ITS HUMAN RIGHTS SITUATION

5.1.5.1 The Legal and Political History

The UK is composed of Great Britain (England and Wales,1067 Scotland)1068 and Northern Ireland,1069 all of which in a cultural sense are separate nations. The UK

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1064 Canadian Institute of Health Research, above n 891.
1066 Canadian Institute of Health Research, above n 891.
1067 ‘Wales was absorbed by England between 12th and 16th centuries and an Act of 1536 completed the political and administrative union of England and Wales. Wales has no separate legal system but follows the same as England’: Bureau of European and Eurasian Affairs US Department of State, Background Note: United Kingdom (19 July 2011) US Department of State <http://www.state.gov/r/pa/ei/bgn/3846.htm>.
1068 ‘In 1707, England and Scotland were unified as Great Britain. Both of them have separate legal systems but are governed by a single Parliament at Westminster’: ibid.

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was established in 1801 with the union of Great Britain and Ireland, but only achieved its present form in 1922 with the partition of Ireland, hence its official name the ‘United Kingdom of Great Britain and Northern Ireland’. The UK is a non-federal state and a Constitutional monarchy. However, the monarch (currently Queen Elizabeth II) is politically impartial and has limited powers. The power of the monarch is, therefore, largely ceremonial and are exercised on the advice of her ministers. All important formal powers are exercised by the Prime Minister, the Cabinet and other ministers, who are accountable to the UK Parliament. Parliament is, therefore, supreme, and under the doctrine of parliamentary sovereignty or supremacy (which is central to the UK Constitution), no court or other body in England and Wales can question the legitimacy of laws made by the Parliament. Under the British Constitution (which is not written and consists partly of statutes and partly of common law and practices), parliament exercises legislative (that is, law-making) power. ‘Much of the relationship between the Sovereign and Parliament is conventional rather than statutory.’

The legislature of the UK is known as the Houses of Parliament and consists of two houses: House of Commons and the House of Lords (the lower and upper houses,
respectively, of this bicameral system).\textsuperscript{1081}  There are two main forms of primary legislation: \textit{Public General Acts} and \textit{Local and Personal Acts}. Statutory Instruments (SIs) are regulations made under the authority of an Act of Parliament, are delegated legislation.\textsuperscript{1082} Government functions are subdivided into municipalities, counties and parliamentary constituencies.\textsuperscript{1083} Local authorities within the UK provide services, and exercise some governmental functions within local areas and have a certain degree of legal freedom and political independence. However, local authorities obtain all their powers from Parliament and Parliament can legislate on any subject for the whole nation.\textsuperscript{1084}

The UK legal system is based on English common law principles. Since 1189, English law has been described as a common law rather than a civil law system. The common law is based on customs and traditions,\textsuperscript{1085} and the main feature of English common law is that the case law is developed by judges in court (in the creation of precedents)\textsuperscript{1086} as they make decisions in regard to particular sets of facts in cases brought before them and in regard to applying statutes (and common sense) to cases before them. Legislation can be amended or repealed by Parliament.

\subsection*{5.1.5.2 Human Rights Situation in the UK}

The human rights situation of any particular country depends on many factors, such as, the historical and legal background, political, socio-economic system, structure as well as form of government, and what kind of state system they have, their beliefs, state mechanism, population density, foreign policy, the country’s various capacities as well as types of problems it faces. Consequently, which human rights and to what extent the general people will enjoy them depends on many of these factors.

The \textit{Magna Carta} (1215), the \textit{Petition of Right} (1628) and the \textit{Bill of Rights Act} (1689) are three landmark English legal charters protecting the rights of individuals

\begin{thebibliography}{99}
\bibitem{1081} www.parliament.uk, \textit{The Two-House System} (4 October 2011) <http://www.parliament.uk/about/how/role/system/>; see also Gillespie, above n 1054, 259.
\bibitem{1082} Carter, above n 1070.
\bibitem{1085} Walker and Ward, above n 1073, 5.
\bibitem{1086} Ibid 58. See also Slapper and Kelly, above n 1076, 55; Kiralfy, above n 1075, 75.
\end{thebibliography}
and civil rights. These greatest Charters had also a huge influence on the developing English common law and legal system. In far more recent times, the UK is one of the founder members of the UDHR and it also joined the European Economic Community (now the European Union) in 1973, and, as a signatory to the European Convention on Human Rights (ECHR), is bound by this regional human rights agreement. This Convention enshrines fundamental civil and political rights. Accordingly, the rights and freedoms guaranteed by the ECHR are incorporated into UK law in the Human Rights Act (HRA) of 1998. This allows for the provisions of the Convention to be applied directly by the UK courts. The HRA is about giving further effect to rights contained within the ECHR. The Act has been very widely publicised, and public authorities are legally obliged to respect fundamental human rights in the UK. Like the ECHR, this Act aims to ensure everyone’s rights are properly respected. It also ‘gives people a clear legal statement of their basic rights and fundamental freedoms’. This means giving proper value to human rights is an important issue in the UK.

1089 Documents asserting individual rights, such as the Magna Carta (1215), the English Bill of Rights (1689), the French Declaration on the Rights of Man and Citizen (1789), and the US Constitution and Bill of Rights (1791) are the history-making precursor documents for the Universal Declaration of Human Rights (‘UDHR’).
1091 ECHR.
1093 HRA.
1095 Ibid 5 [1.4]–[1.5]; see also HRA, introductory text (preamble).
1096 HRA s 6.
1097 Department for Constitutional Affairs, above 1094, 5 [1.5].
1098 Ibid [1.4].
The political and economic history of the UK reveals that the country has never been ruled by any other country or it was never been a colony of another country.\textsuperscript{1099} By contrast, it was itself a colonial power. During the 19th century, the British Empire covered one-fourth of the world’s surface. The first half of the 20th century mainly saw the UK’s strength seriously depleted in two world wars, and the latter half ‘witnessed the dismantling of the Empire and the UK rebuilding itself into a modern and prosperous European nation’.\textsuperscript{1100} British Imperialism in Asia (particularly in the Indian sub-continent) traces its roots back to the early 17th century.\textsuperscript{1101} Using as its protection the UK’s dominant merchant navy and agreements with successive governments in Britain and sometimes local princes in India, the British East India Company (an early joint stock company) established itself first as trading body and later as the most important political force in this region.\textsuperscript{1102} The subsequent imposition of Imperial British rule replaced this 	extit{de facto} colonial (but still essentially merchant) power — though one which even had its own troops to defend its interests and in several locations its own coinage and that had lasted almost a century — with a governmental one. In this regard ‘nineteenth-century formalisation of the British Empire in Southeast Asia’ is rightly addressed as ‘British Imperialism’ by Kenneth R Hall.\textsuperscript{1103} The East India Company had essentially colonised the Indian and South East Asian region, governmental colonial rule was to follow.\textsuperscript{1104} In terms of socio-economic conditions, the UK is a leading trading power, which has successfully transformed itself into a global financial centre. It is currently the third largest in Europe\textsuperscript{1105} and sixth-largest economy in the world.\textsuperscript{1106} Its position as a colonial power faded rapidly in the 20th century (with India, for example, becoming independent in 1947) but its legacy endures in its former colonies, which often have

\textsuperscript{1099} ‘Britain has not been invaded or occupied for almost 1,000 years. The last successful invasion was in 1066 by the Normans’: for further details see Darlington, above n 1074.


\textsuperscript{1101} Vinay Lal, \textit{History and Politics: British India} (4 October 2011) Manas <http://www.sscnet.ucla.edu/southasia/History/British/BrIndia.html>.

\textsuperscript{1102} B H Farmer, \textit{An Introduction to South Asia} (Methuen, 1983) 36–7.


\textsuperscript{1104} Farmer, above n 1102, 36–44.

\textsuperscript{1105} CIA, \textit{United Kingdom}, above n 1100.

\textsuperscript{1106} Bureau of European and Eurasian Affairs, above n 1067.
retained its common law system and, at least in some instances, an attachment to parliamentary democracy.\textsuperscript{1107}

The concept of democracy developed in the UK,\textsuperscript{1108} evolving its institutions into a vestigial constitutional monarchy and a lively parliamentary system, a largely secular state (despite having an established church), and a system that embodies the separation of the three key powers – the legislature, the judiciary and the executive. The notion of human rights has progressed in the UK in a different way when compared to the countries that were ruled or were colonies of other countries. The adoption and implementation of the \textit{HRA} leads people to have more confidence in key state bodies, encouraging more openness and participation in the democracy. Basic human rights values enshrined in the \textit{HRA} also help to promote a greater unity and fairness in the UK society. Starting from \textit{Magna Carta}, the UK society has centuries old pro-human rights movements. Pro-human rights movements always benefited the UK society constructively and this also includes in regards to the protection of privacy and genetic privacy.

The enjoyment of centuries old principles of human rights principles, values that embrace such rights, and the presence of activities related to various progressive civil liberties make the people of the UK more aware of their human rights and privacy violations in comparison to people in many other countries. One glorious example is the \textit{S v Marper case} where, since the UK is a member nation of the EU, an appeal was able to be made to the European Court of Human Rights (ECtHR), which the appellants in this case did\textsuperscript{1109} It is also appropriate to articulate that even after the judgment in \textit{Marper case} by the ECtHR (where the Court declared the retention of DNA samples and information derived from them in the case of persons not convicted of any crime a breach of the right to privacy), the current rule and practice with regards to the use of DNA data by UK government is not undisputed. The examination undertaken and the analysis conducted in the following case study of the UK NDNAD will attempt to determine how far human rights and privacy are

\textsuperscript{1107} Bangladesh, for example, has that attachment to parliamentary democracy. See generally Staff Correspondent, 'Verdict Paves Way for Secular Democracy: Says Law Minister', \textit{The Daily Star} 30 July 2010 <http://www.thedailystar.net/newDesign/news-details.php?nid=148678>.

\textsuperscript{1108} CIA, \textit{United Kingdom}, above n 1100.

\textsuperscript{1109} \textit{S} (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008).
protected in UK jurisdiction while using DNA data in its justice delivery system. It will also draw on if there is any gap between NDNAD and NFDPL (that is, DNA service system of both developed and developing countries).

5.1.6 NATIONAL DNA DATABASE (NDNAD)

One of the main features of the UK legal system (which is based on the adversarial principle) is to convict persons of a criminal offence only when there is sufficient evidence to reach the conclusion that a suspect is guilty ‘beyond reasonable doubt’. Forensic science has played a key role in many trials, and DNA profiling is currently considered the most important advance in the area. The investigation techniques (that is, DNA profiling) adopted by modern forensic science ‘have had a profound effect’ in resolving many legal cases in the UK jurisdiction. Covering England and Wales, the NDNAD was launched on 10 April 1995 at the Forensic Science Service (FSS) laboratory in Birmingham and ‘is the oldest and largest national DNA intelligence database’. It soon became an internationally accepted database and nowadays its use regarded by police and forensic science personnel as ‘almost commonplace’.

Williams and Johnson have argued that ‘the establishment and use of the NDNAD is a realization of a scientific potential developed in accordance with specific state interests’ of the UK and because of that interest, ‘has prospered and grown’. Because of its successful use of DNA technology, the UK is regarded as the ‘world leader’ in forensic DNA databasing. Citing the successful experience of the UK in April 2005, the Garda (Republic of Ireland Police) Commissioner, Noel Conroy, claimed that ‘UK NDNAD had resulted in a 5% reduction in crime and a 50% increase in detections’. A large number of samples are constantly being added to the NDNAD (sometimes more than 2000 samples in a week), and as a result, the number of people whose information is stored or retained on this database is

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1111 Lynch, above n 261, 142.
1114 Williams, and Johnson, ‘Forensic DNA Databasing: A European Perspective’, above n 376, 82.
increasing enormously. Sarah Lipscombe also addressed the NDNAD as ‘the world leader’ for being the largest DNA database throughout the world.

Following the success of the UK database some developed countries have implemented their own national DNA databases and along similar lines. These include, for instance, New Zealand, some European countries, the USA and Canada. In 1996, New Zealand, a ‘geographically small and isolated nation with a modest population size of less than four million’, was second only to the UK in legislating to establish a national DNA database. Australia and South Africa are among other nations also developing their own DNA databases.

Before analysing the potentials and pitfalls of the NDNAD, it is important to examine its historical background, nature and composition. The following section will concentrate on this point.

5.1.6.1 Background of the NDNAD

In the late 1980s and early 1990s a series of high-profile miscarriages of justice happened in the UK. These included the Guildford Four, the Maguires, the Tottenham Three, the Cardiff Three, the Taylor Sisters and over a dozen cases, which is handled by the currently divided West Midlands Serious Crime Squad. On 14 March 1991 and after more than sixteen years of what the Court of Appeal had determined was wrongful imprisonment the Irishmen known as the Birmingham

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1116 Linacre, above n 385, 1841.
1121 Ibid.
Six had their convictions quashed by the Court of Appeal.\(^{1123}\) On the day of their release, the then Home Secretary, Kenneth Baker announced the Royal Commission on Criminal Justice (also known as the ‘Runciman Commission’ after its chair, Viscount Runciman) in March 1991.\(^{1124}\) The Commission can therefore be said to have been established in response to an erosion of public confidence in the UK criminal justice system. The Runciman Commission emphasised that:

> The widely publicised miscarriages of justice which have occurred in recent years have created a need to restore public confidence in the criminal justice system.\(^{1125}\)

Further, in their 1993 Report the Royal Commission on Criminal Justice recommended that:

> [T]here should be clear legislative provision for the more extensive storage of DNA samples or data both for the purpose of identifying offenders and for the purpose of keeping a frequency database overseen by an independent body.\(^{1126}\)

In response to the commission’s recommendation, the then Home Secretary, Michael Howard, made an announcement and commissioned the FSS and the Metropolitan Police Forensic Science Laboratory in 1994 to conduct a pilot study to assess the potential of DNA technology and a DNA database.\(^{1127}\) Based on the outcome of this study, the Home Office decided to form a national forensic DNA database and the NDNAD was established in April 1995 in the UK jurisdiction for solving crime and exonerating the innocent.\(^{1128}\) The UK government has provided constant financial and legislative support since the establishment of the NDNAD.\(^{1129}\) As part of this process, in 1994 the government enacted the \textit{Criminal Justice and Public Order Act 1994}\(^{1130}\) (herein after referred to as the \textit{CJPOA}) amending the \textit{Police and Criminal


\(^{1123}\) Young and Sanders, above n 1122, 447.


\(^{1126}\) Ibid.


\(^{1129}\) Johnson, Williams and Martin, ‘Genetics and Forensics’, above n 1126; Asplen and Lane, above n 1050.

\(^{1130}\) \textit{Criminal Justice and Public Order Act 1994} (UK) c 33 (‘CJPOA’).
Evidence Act 1984 (hereinafter referred to as the PACE Act) and for the first time the said Act provided some rules in regard to the expansion of police powers regarding DNA sample collection, particularly that from non-intimate samples (that is mouth swabs, saliva and hair samples). There was no mention about the establishment of the NDNAD in the CJPOA. At the same time, the Home Office issued a Circular — the Criminal Justice and Public Order Act) 16/95 on the NDNAD, which provided guidelines for the establishment, operation and use of this database. The establishment of the database is based on DNA profiles obtained from non-intimate samples (mouth swabs or buccal scrapes and hair samples) under the PACE Act as amended by the CJPOA and also from profiles obtained from biological material recovered from scenes of crime.

When investigating serious crimes, up until 1984 the police were allowed to ask doctors to obtain a blood sample for DNA testing with the consent of volunteers. DNA profiling has been in use in the UK since 1985. However, forensic DNA technology was comparatively limited in its use at that time. Until the introduction of the augmented technologies (such as the analysis of polymorphic short tandem repeats) which is an adequately sensitive and rigorous system, the actual benefit of the formation of efficient and effective DNA databases could not be realised. Due to the establishment of NDNAD, it is now recognised that DNA databases have the potential to provide the criminal justice systems with an efficient way to combat crimes.

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1131 Home Office Circular 16/95: National DNA Database (31 March 1995), as amended by HOC 47/1996, HOC 27/1997 and HOC 58/2004 which provided guidance on its operation and conditions regarding the taking and submitting of samples, database access and data security issues, for further details see Semikhodskii, above n 84, 79.


1133 Bramley, above n 1132.

1134 Staley, above n 275, 26.


1136 Maciej J Bogusz (ed), Handbook of Analytical Separations: Forensic Science (Elsevier, 2nd ed, 2007) vol 6, 946; see also Martin, Schmitter and Schneider, above n 210, 228.

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5.1.6.2 Nature and Composition

At its inception in 1995, the NDNAD was initially used to store the profiles of convicted criminals only; but the Criminal Justice and Police Act 2001\(^\text{1137}\) and the Criminal Justice Act 2003\(^\text{1138}\) have empowered the UK police to collect and retain DNA samples from those who have been arrested on suspicion for committing a recordable offence. Under the new rules, samples could now be stored even if those arrested person later acquitted of the charge. The changes in legislation led to a rapid expansion of the NDNAD.\(^\text{1139}\) The forensic science service (FSS), which is the main forensic science services provider in the UK, contributed enormously to the formation of the NDNAD.\(^\text{1140}\) In March 2004, the FSS reported that the database contained DNA profiles from around 2.1 million individuals and 2 15 000 crime scenes.\(^\text{1141}\) By 2009, it contained more than 4.5 million records, representing 7.5 per cent of the UK population.\(^\text{1142}\) The Chief Constable, Peter Neyroud, emphasised the significance of the database thus:

> The Database has revolutionised the way the police work to protect the public. It provides forces with more than 3,500 matches each month, including some of the most serious crimes. The majority of the active criminal population now has its DNA recorded and police forces use DNA profiles to solve thousands of cases every year.\(^\text{1143}\)

According to the 2006–07 National DNA Database Annual Report, the use of the NDNAD had resulted in ‘more than 41,000 matches to DNA samples taken from crime scenes and had helped to solve some of the most serious crimes’.\(^\text{1144}\)

According to the National DNA Database Annual Report of 2007–09, the NDNAD

\(^{1137}\) CJPA.
\(^{1138}\) CJA.
\(^{1144}\) Ibid 4.
had rapidly become the largest forensic DNA database in the world, containing just over 5.6 million people’s DNA profiles.1145 The INTERPOL 2008 global survey analysis and results highlighted that ‘NDNAD is six times larger than the second largest database (ie France) in this region and the database size is 2.3 times greater than the other European member countries’.1146 All these statistical data show that the NDNAD of the UK is the most extensive database in the world on a per capita basis. Such a database is also considered to be a step forward in the fight against crime.

The NDNAD system provides the UK crime suppression authority with a broad range of options for the collection and use of different types of DNA samples and a wide scope in terms of the persons from whom DNA can be collected. The availability of a number of options can lead to a refining in the organisation of the database. While the database has become a useful tool in criminal case investigation, helping to resolve cases by detecting genuine offenders, the data also suggests that the operation and management of the biggest DNA database needs proper management and good organisation. The operation, management and ethical oversight of the NDNAD are discussed below.

5.1.6.3 Governance, Management and Oversight

(a) Governance and Management

The overarching authority for management of the NDNAD is the National DNA Database Strategy Board (NDNADSB). At present, the core of the governance structure is based on tripartite arrangements — the Association of Chief Police Officers (ACPO), the Association of Police Authorities (APA), and the Home Office (HO) / National Policing Improvement Agency (NPIA) (as Custodian) (see Figure 10).1147 Each of these will be examined in turn.

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1146 ICPO-INTERPOL, ‘INTERPOL Global DNA Profiling Survey Results and Analysis 2008’ above n 66, 42.
1147 Metropolitan Police Authority (MPA) and MPA Civil Liberties Panel, ’Protecting the Innocent: The London Experience of DNA and the National DNA Database’ (June 2011) 68 [7.1.200]; see also National Policing Improvement Agency (NPIA), NPIA and the DNA Database (29 September 2011) <http://www.npia.police.uk/en/14189.htm>.
Figure 9: Governance, Management and Oversight of NDNAD

*National DNA Database Strategy Board (NDNADSB)*

The *Crime and Security Act 2010* provides the legal basis of the NDNADSB. This Act places the responsibility of publishing the guidance rules for the NDNADSB on the Secretary of State,1148 who also has to make the necessary arrangements for the Board to oversee the operation of the NDNAD.1149 Moreover the NDNADSB is made accountable, by having to submit an annual report to the Secretary of State on its functions.1150 The said Act also provides power to the Board regarding the immediate destruction of DNA samples and DNA profiles (which are retained under the *PACE Act*) through the issuing of guidance documents in accordance with which the chief officer of a police force in England and Wales must act.1151 However, these provisions have yet to be brought into effect.1152 In regards to the NDNADSB, the Protection of Freedoms Bill 2011 recently proposed similar provisions to those of the

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1148 *Crime and Security Act 2010* (UK) c 17, s 23(4) (CSA).
1149 CSA s 23(1).
1150 CSA s 23(5).
1151 CSA sub-s 23(2) and (3).
Crime and Security Act 2010, through the amendments of the PACE Act (that is, by inserting a new s 63AB in the PACE Act).\textsuperscript{1153}

The three major parties of the NDNADSB are (See Figure 10):

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{Fig10.png}
\caption{Tripartite Arrangements of the NDNADSB}
\end{figure}

(a) Association of Police Authorities (APA): It ‘represents police authorities across England and Wales’.\textsuperscript{1154}

(b) Association of Chief Police Officers (ACPA): It ‘is a private limited company that leads the development of policing best practice in England, Wales and Northern Ireland’.\textsuperscript{1155}

(c) Custodian (HO / NPIA): In order to set standards for procedures and profiling of the NDNAD, as well as for approving and monitoring the laboratory that supplies DNA services, there is an NDNAD ‘custodian’. The role was initially performed by the FSS, that is, from 1995 to 2005, then, as an interim measure, the role was transferred to the HO. Finally (after its commencement in April 2007), the NPIA took over custodianship of the NDNAD.\textsuperscript{1156} The NPIA is responsible for running and maintaining the database operations, as


\textsuperscript{1154} MPA and MPA Civil Liberties Panel, above n 1147, 90.

\textsuperscript{1155} Ibid.

\textsuperscript{1156} NPIA, ‘National DNA Database Annual Report’, above n 1145, 4.
well as ensuring the NDNAD data integrity.\textsuperscript{1157} The NPIA therefore performs several roles as the Custodian:

(i) It is responsible for overseeing the NDNAD services, and for accrediting all the scientific laboratories that analyse DNA samples, and monitoring the contract for the operation and maintenance of the database.\textsuperscript{1158}

(ii) It ‘plays a key role in ensuring the ongoing quality and integrity of the information held in the database’,\textsuperscript{1159} as it is important to ensure that the DNA information (which is stored on police information systems) is managed carefully and responsibly within agreed guidelines in order to maintain public trust and confidence.

The NPIA performs all its roles and responsibilities under the set rules of ‘accountability and supervision’ provided by s 28 of the \textit{Police and Justice Act 2006}.\textsuperscript{1160} The Secretary of State may require Her Majesty’s Chief Inspector of Constabulary to inspect, and report on, the efficiency and effectiveness of the agency.\textsuperscript{1161} The NPIA also operates under the \textit{Data Protection Act 1998} and \textit{Freedom of Information Act 2000}.\textsuperscript{1162}

In addition, membership of the NDNADSB has further been extended to include the Forensic Science Regulator (FSR), NDNAD Ethics Group, Human Genetics Commission (HGC) and the Information Commissioner Office (ICO) as observers.\textsuperscript{1163} Their roles are as follows:

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\textsuperscript{1157} Butler, \textit{Advanced Topics in Forensic DNA Typing}, above n 1095; NPIA, \textit{NPIA and the DNA Database}, above n 1147; see also National Policing Improvement Agency (NPIA), ‘Memorandum by the National Policing Improvement Agency (NPIA) to the House of Lords Select Committee on the Constitution: Surveillance and Data Collection Inquiry’ (2007) [12]; National Policing Improvement Agency (NPIA), \textit{Minister Opens New Home for DNA Database Unit} (11 May 2007).

\textsuperscript{1158} NPIA, \textit{NPIA and the DNA Database}, above n 1147; see also NPIA, \textit{Minister Opens New Home for DNA Database Unit}, above n 1157.

\textsuperscript{1159} NPIA, \textit{NPIA and the DNA Database}, above n 1147; NPIA, ‘Surveillance and Data Collection Inquiry’, above n 1134; NPIA, \textit{Minister Opens New Home for DNA Database Unit}, above n 1157.

\textsuperscript{1160} \textit{Police and Justice Act 2006} (UK), c 48, sch 1 pt 3 s 28 (1).

\textsuperscript{1161} Ibid sch 1 pt 3 s 30 (1).

\textsuperscript{1162} NPIA, ‘Surveillance and Data Collection Inquiry’, above n 1159, [4].

\textsuperscript{1163} MPA and MPA Civil Liberties Panel, above n 1147, 68 [7.1.201]; see also NPIA, \textit{NPIA and the DNA Database}, above n 1147.
Forensic Science Regulator (FSR): an important criterion of forensic science services is high standards. In order to maintain such standards, the post of Forensic Science Regulator (FSR) was created following the 2005 recommendations of the Science and Technology Committee.1164 The FSR ‘is a public appointee whose function is to ensure that the provision of forensic science services across the criminal justice system is subject to an appropriate regime of scientific quality standards’.1165 The FSR is ‘to provide independent advice on quality standards to the government and the criminal justice system’.1166 Such kind of independence allows the regulator take unbiased decisions.1167

Human Genetic Commission (HGC): This a government advisory body that focuses on the social, ethical and legal issues with regards to developments in human genetics and their impact on human life. The Commission is accountable to Home Office Ministers.1168

Information Commissioner’s Office (ICO): ICO is the UK’s independent authority created to uphold information rights in the public interest, promote openness by public bodies and data privacy for individuals. It attends the board as an independent observer.1169 Moreover the security arrangements associated with the NDNAD are overseen by the NDNADSB, as well as by the ICO.1170

NDNAD Ethics Group: The ethical oversight role of the National DNA Database Ethics Group will be discussed in detail in the following section.

(b) Ethical Oversight

NDNAD Ethics Group

1166 Home Office, Forensic Science Regulator, above n 1165.
1167 Ibid.
1168 MPA and MPA Civil Liberties Panel, above n 1147, 90.
1169 Ibid; see also Information Commissioner's Office (ICO), (7 October 2011) <http://www.ico.gov.uk/>.
Following a strong recommendation from the report of the HGC as well as from the Select Committees on Science and Technology from both of the Houses of Parliament, the NDNAD Ethics Group was established in 2007. Critics of the lack of independent ethical oversight for the NDNAD also urged the establishment of such an ethics group. In 2007, members to the independent NDNAD Ethics Group were appointed and in the same year the ethics group held its inaugural meeting.

At present the NDNAD Ethics Group is an advisory non-departmental public body of the HO. Its main vision is:

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\text{[T]o ensure that all decisions relating to the forensic use of DNA (obtaining, storage, retrieval) are considered in the light of ethical and human rights principles, and that individuals may only have their DNA taken for lawful forensic purposes and at all times be treated fairly and with dignity and respect.}
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The Ethics Group has the responsibility of providing Ministers with independent ethical advice on the operation and practice of the NDNAD.

### 5.1.6.4 Forensic Science Service – Changing Role

The FSS is the leading forensic service provider in the UK with a role of analysing and interpreting evidence from the crime scene. It has been at the forefront of developing technology for DNA profiling since 1987. Later it became the executive agency of UK HO in 1991. Finally it achieved a ‘scientific breakthrough’ through the invention of chemical which enables DNA profiling in

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1171 Postnote, above n 343, 4; see also Lynch, above n 261, 143; Alexandra Paul, Debating Human Genetics: Contemporary Issues in Public Policy and Ethics (Routledge, 1st ed, 2011) 73.
1173 Lynch, above n 261, 143.
1174 Ibid.
1177 Ethics Group National DNA Database, above n 1172, 5[2.0].
1178 Ibid 5[1.0].
1180 Science and Technology Committee House of Commons, above n 1165, 10 [17].
1995. This led directly to the establishment of the NDNAD.\textsuperscript{1181} Initially, FSS was the sole supplier of DNA profiles for this database.\textsuperscript{1182} During 1995–2005, as outlined above, it performed the role of Custodian for the NDNAD,\textsuperscript{1183} which role was then transferred to the HO in 2005 and then to the NPIA, following its launch in 2007.\textsuperscript{1184}

To increase its financial flexibility, the FSS was granted trading fund status in 1999.\textsuperscript{1185} This necessitated the ‘custodian’ role transfer as it was essential to retain the oversight and management of the NDNAD within a public sector environment.\textsuperscript{1186} The change appears destined to be short-lived, as this agency (the NPIA) is to be ‘dissolved’ and its responsibilities dispersed as part of the massive overhaul of UK policing decided upon by the government.\textsuperscript{1187}

Subsequently, in December 2005, the FSS became FSS Ltd — a market leading government-owned, contractor-operated (GovCo) company, a step towards ‘Public-Private Partnership’ (PPP). It thereby changed its status from trading fund to GovCo Company. Then (as part of the realignment of UK policing and forensic services alluded to above in regard to the NPIA), on 14 December 2010, the Government announced the closure of the FSS, stating:

\begin{quote}
We have [...] decided to support the wind-down of FSS, transferring or selling off as much of its operations as possible. [...] our firm ambition is that there will be no continuing state interest in a forensics provider by March 2012.\textsuperscript{1188}
\end{quote}

However, critics raise serious concerns saying that a plan to close down the ‘provider of scientific expertise [FSS] to police amounts to a risky, nationwide experiment with the criminal justice system’.\textsuperscript{1189}

\begin{footnotes}
\footnote{FSS, \textit{DNA Solutions}, Above n 1179.}
\footnote{Bramley, above n 1132, [3]–[4]. See also Postnote, above n 343, 2.}
\footnote{Ibid.}
\footnote{NPIA, ‘National DNA Database Annual Report’, above n 1145, 4.}
\footnote{Science and Technology Committee House of Commons, above n 1165, 10 [18].}
\footnote{National DNA Database, ‘Annual Report (2006–07)’, above n 1143, 8.}
\footnote{Science and Technology Committee House of Commons, above n 1165, 10 [17].}
\footnote{Ian Sample and Sandra Laville, \textit{Forensic Science Service Closure Could Leave Trail of Damage} (8 September 2011) guardian.co.uk <http://www.guardian.co.uk/science/2011/sep/08/forensic-science-service-closure-damage>.}
\end{footnotes}
(c) Evaluation

There is good governance and management in the NDNAD. In this regard the Chair of the Board, Gary Pugh, commented that ‘National DNA Database has the most open and broad governance of any police database’. Moreover he emphasised ‘the importance of widening the membership of the database to provide a more collaborative approach in the oversight and its direction’. Nevertheless, despite its reported good governance and oversight, there remain some concerns in this area. The MPA Civil Liberties Panel noted that:

> Although the Strategy Board Chair had already widened the governance structure, we remain concerned about how independent this structure is and how robustly it was representative of the public and reflected their concerns.

Moreover, the FSR, the Ethics Group and the HGC have expressed their views that in order to increase public confidence and cooperation, more open and independent oversight structures are required to be put in place. Furthermore, a desire was also expressed with regards to regular publication of data reviews, an independent appeals process for applications those who want to be removed their subject profiles and an enhanced role for the Ethics Group.

Finally, it is argued that even with this robust governance and oversight system, there remain some concerns with regards to openness, transparency and accountability which are necessary to maintain the public confidence in the NDNAD. Analysing the provisions of the proposed *Freedom of Information Bill*, it can also be argued that the NDNADSB should report to the parliament not the Secretary of State. Moreover, there should be some public representation on the NDNADSB.

There are also concerns that the winding up of the FSS might put at risk the forensic services to the database.

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1190 MPA and MPA Civil Liberties Panel, above n 1147, 68 [7.1.203].
1191 Ibid.
1192 Ibid 69 [7.1.203].
1193 Ibid [7.1.204].
5.1.6.5 Technology in Use

DNA profiling processes are ‘constantly changing due to the enhancements of methods and technology’. The FSS has been a pioneer in the development of modern, sensitive and rapid DNA data analysis, recording and matching systems for the NDNAD. Several new and refined techniques for DNA profiling have been invented since the inception of the NDNAD (and are summarised below).

(a) Multi-Locus Probe (MLP)

‘Multi-Locus Probe’ (MLP) was the first technique introduced and used by the FSS for DNA profiling in 1987. Sir Alec Jeffreys was the inventor of the MLP technique and this technique relies on non-coding DNA called ‘Variable Number of Tandem Repeats’ (VNTRs) and is also known as ‘Restriction Fragment Length Polymorphism’ (RFLP). MLP, which is known as ‘DNA fingerprinting’, is defined by Joblings and Gill as:

[H]ypervariable loci known as mini-satellites ... were detected by hybridization of probes to Southern blots of restriction-enzyme-digested genomic DNA. Shared ‘core sequences’ between different minisatellite loci allowed probes to detect many independent mini-satellites simultaneously, yielding the hypervariable multi-band patterns ...

Foreman et al noted that the ‘MLPs were compared visually, rather than relying on any agreed statistical methods’ but that the process had a ‘significant disadvantage’ namely that ‘relatively large DNA samples were required to give a reliable result’.

(b) Single Locus Probe (SLP)

In 1990s when there was an awareness of the limitations of the MLP technique, the FSS and the Metropolitan Police Laboratory developed ‘Single Locus Probe’ (SLP) and at that time it ‘was considered more suitable for forensic work.’ This is

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1194 Lipscombe, above n 1117, 5.
1195 Ibid.
1196 For Further Details See Section 2.1.3.3 of Chapter 2.
1198 Foreman, above n 274, 474.
1199 Lipscombe, above n 1117, 5.
another form of RFLP. The SLP is preferred because it is easier to interpret and capable of being used to analyse mixed DNA samples. DNA analysis results could be generated even from degraded DNA. As a result during that time (that is, 1988–1990) the main focus of DNA profiling in the UK was the SLP testing.

(c) Second General Multiplex (SGM)

Following the year 1994, more and more cases were subjected to DNA testing and that required even more advanced techniques than that of the SLP. The DNA profiling techniques therefore further progressed and were refined through the development of the Short Tandem Repeats (STRs) technique as well as by the advent of the ‘Polymerase Chain Reaction’ (PCR) technique. The PCR technique basically ‘enables STRs typing to be performed’. The first STRs technique that was introduced at the FSS was the ‘quadruplex’ (quad). ‘Quad’ looks at ‘four STRs sequence’ or loci and at that time it was used in routine casework throughout the UK.

The STR-PCR technique offered some clear advantages over the SLP system, such as DNA could be analysed using comparatively small STR loci, and a result could be obtained even when the DNA is highly degraded. A study by Gill ‘demonstrated that STRs could be reliably analysed from 70 year-old bones’. Consequently, from 1995 to 1999, the standard profiling system that was introduced for the NDNAD was the ‘Second Generation Multiplex (SGM)’ It was the original DNA profiling system used for this database upon its introduction in 1995. This technique ‘allows the simultaneous analysis of 6 non-coding STRs regions of DNA (ie 12 markers or alleles)’. A gender marker was also examined. Finally it produced

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1200 For further details see section 2.1.3.3 of chapter 2.
1201 Ibid. See also Foreman, above n 274.
1202 For further details see Section 2.1.3.3 of Chapter 2.
1205 Ibid 69.
1206 Lynch, above n 261, 144–5.
1207 Staley, above n 275, 15.
1208 Lipscombe, above n 1117, 5.
1209 Ibid; see also National Policing Improvement Agency (NPIA), 'National DNA Database Annual Report' (2007–09), 42.
a DNA profile with an average discrimination power of 1 in 50 million.\textsuperscript{1210} That means in this technique the probability of matching of two unrelated persons is 1 in 50 million.\textsuperscript{1211} In SGM method there is a mixture of complex as well as simple STRs.

**(d) SGM Plus (SGM+)**

As the size of the database increases, improve techniques with more accurate matching of profiles were introduced by the FSS than the use of the SGM method.\textsuperscript{1212} In this regards, L A Foreman et al argued that:

> As the STR profiling systems evolved, improvements were also seen in terms of increasing forensic discriminating power; each new system would consider a greater number of loci than the previous one.\textsuperscript{1213}

In 1999, the SGM method was upgraded and replaced by SGM Plus (SGM+) to reduce the chance of an `adventitious match`\textsuperscript{1214} as the size of the database increased.\textsuperscript{1215} From 1999 onwards, this has been the DNA profiling technique used for the NDNAD. This method is compatible with SGM, but more discriminating. In the SGM+ analysis of 8 additional STR markers or alleles from 4 non-coding STR regions\textsuperscript{1216} are conducted together with existing SGM (which consists of the 6 regions or loci, that is 12 markers or alleles), plus the amelogenin sex test.\textsuperscript{1217} Ten different STRs markers or areas of DNA (that is, consisting of all six SGM loci plus a further four STR loci) and a gender test\textsuperscript{1218} are examined in the SGM+ method. This analysis produces 20 bits of information (using two-digit numbers). It consists of 20 two-digit numbers because each person has two copies of each marker, one inherited from each parent, and a sex indicator.\textsuperscript{1219} An example of an SGM+ profile

\textsuperscript{1210} Lipscombe, above n 1117, 5.
\textsuperscript{1211} Werrett, above n 1140, 35–6.
\textsuperscript{1212} NPIA, ‘National DNA Database Annual Report’, above n 1145, 42.
\textsuperscript{1213} Foreman, above n 274, 478.
\textsuperscript{1214} Lynch argued that ‘an adventitious match is a chance match between the profiles of two different people and it gives a false positive result’, Lynch, above n 261, 145.
\textsuperscript{1215} Ibid 144–5.
\textsuperscript{1216} Foreman and Evett identified, ‘four STR loci, D16S539 (D16), D2S1338 (D2), D3S1358 (D3) and D19S433 (D19)’, L A Foreman and I W Evett, ‘Statistical Analyses to Support Forensic Interpretation for a New Ten-Locus STR Profiling System’ (2001) 114 International Journal of Legal Medicine 147, 147.
\textsuperscript{1217} Ibid.
\textsuperscript{1218} Foreman and Evett also highlighted that, ‘the Gender marker the Amelogenin (Amelo) is used for the sex-indicating test’: ibid; Lipscombe, above n 1117, 5.
\textsuperscript{1219} Nuffield Council on Bioethics, *What is Bioinformation?* (31 October 2011) <http://www.nuffieldbioethics.org/bioinformation/bioinformation-what-bioinformation>; see also
would be ‘15, 18; 6, 9; 11, 13; 22, 22; 31, 32.2; 14, 17; 17, 20; 11, 12; 13, 16.3; 15, 16; X, Y’.1220

Since a DNA profile consists of 20 numbers and a gender indicator in this technique, the chance of matching of DNA profiles of two unrelated individuals is on average less than one in a billion.1221 Moreover, the use of a greater number of STRs increases the discriminatory power of the test, reducing the number of ‘false’ matches.1222 People may have the same number of repeats at anyone STR marker, but it is the information from all ten markers that gives each person their individual profile.1223

The process of DNA profiling is changing gradually with the advance of techniques and systems. Some new developments include, pendulum list searching (PLS) and DNA-boost, low copy number (LCN) and single nucleotide polymorphism (SNP) techniques. Among these, PLS and DNA-boost have been developed for mixture analysis. Low copy number (LCN) is extremely sensitive and enables DNA analysis to obtain a DNA profile from a sample that contains only a few cells.1224 Furthermore, SNPs may be the future of DNA profiling because this method is more efficient than STRs.1225

Though operational aspects of the NDNAD are well managed, the current legislative scenario and practice of the UK police resulted in a number of ethical controversies, such as those in regard to human rights and privacy violations. Moreover, the rules regarding DNA sample collection, analysis and retention as well as the destruction of DNA from NDNAD are covered by the UK legislation have also been subject to criticism. In order to address these issues, the legislative development of the UK governing all these processes (including the governance of the NDNAD) has undergone constant change. The following section will analyse legislative


1221 Postnote, above n 343, 1.
1222 Staley, above n 275, 15.
1223 Ibid 14.
1224 Foreman, above n 274, 479.
1225 Lipscombe, above n 1117, 5.
developments or changes related to the relevant legislation with a view to establishing whether there is any provisions that pose a risk in regard to individual privacy.

5.1.6.6 The NDNAD Governance Regulation or Legislative Framework

As indicated earlier, the Runciman Commission made a series of recommendations in 1993 regarding the extensive use of human DNA data. All these recommendations were subsequently translated into legislation — the CJPOA. The Commission therefore provided the legislative foundation for the establishment of the NDNAD. In the same year, similar to this commission, the House of Lords Select Committee on Science and Technology urged clear and consistent legislative provisions for the collection, use and retention of DNA samples by the police, and its admissibility as evidence in criminal prosecution. The Committee also argued for consistent legislative provision to support the forensic use of DNA. Consequently, the UK government has fulfilled its promise of establishing the NDNAD by making available constant financial support and enacting pieces of legislation. These Acts of Parliament are the foundation for the NDNAD and they have provided extensive powers for the police force to use the DNA technology during criminal case investigation. In terms of funding, recent cutbacks to the budget provision for policing have led to a greater reliance on ‘user pays’ and a move to streamline the force and its operations, including the eventual outsourcing of forensic services.

In regards to police powers and the use of DNA technology, there has been a series of legislation from 1993 until the present. The first was the PACE Act.

(a) Police and Criminal Evidence Act 1984 (PACE)

1227 Ibid.
1228 Ibid.
1229 Ibid.

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This Act governs the major part of police powers of investigation, including arrest, detention, interrogation, entry and search of premises, personal search and the taking of samples.\textsuperscript{1231} The \textit{PACE Act} fulfilled the need to provide for the extensive forensic use of DNA information in the criminal investigation. This Act also lay the grounds for the collection of DNA samples and or profiles, as well as retention of such data on the NDNAD. It permitted the expansion of police power of taking DNA samples without consent, and retaining such samples as well as profiles indefinitely. A number of features of this Act came in for criticism:

- power of police to obtain a DNA sample without consent from those arrested for a recordable offence;
- indefinite retention of all samples and profiles placed on the NDNAD;
- inclusion of minors on this database under these powers;
- indefinite retention of volunteer samples;
- use of DNA samples on the database ‘for research purposes.’\textsuperscript{1232}

A number of amendments have subsequently been made to the \textit{PACE Act} in relation to the criteria for obtaining (and the methods used) DNA samples and profiles as well as for their use and retention. The following discussion briefly outlines the recent legal changes in regard to ‘the way the police can collect, retain and use DNA samples’:\textsuperscript{1233}


The \textit{CJPOA}\textsuperscript{1234} can be identified as a direct legislative measure enabling both the establishment of the NDNAD and the facilitation of its immediate growth. The fundamental and most far reaching aspect of this legislation was the creation of a new framework for DNA sample collection (which is essential for DNA profiling) for the police administration. Part IV of the \textit{CJPOA} has amended various sections\textsuperscript{1235} of the \textit{PACE Act} to broaden the powers of police to collect DNA samples. DNA

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\textsuperscript{1231} \textit{PACE Act}.
\textsuperscript{1233} Gene Watch UK, \textit{A Brief Legal History of the NDNAD} (31 October 2011) <http://www.genewatch.org/sub-537968>.
\textsuperscript{1234} \textit{CJPOA}.
\textsuperscript{1235} \textit{PACE Act} pt v ss 62–5, as amended by \textit{CJPOA} ss 54–8.
\end{flushleft}
sample collection on routine basis was therefore encouraged under this law. The following areas of the *PACE Act* have been amended by the *CJPOA*:

(i) Amendment to the Types of Offence
This amendment changed the type of offence. While originally under the *PACE Act* an intimate sample may be taken for the ‘serious arrestable offence’, the *CJPOA* amended this provision and changed the type of offence that qualified the taking of such a sample. Under this amendment an intimate sample may be taken for ‘recordable offence’.

(ii) Intimate and Non-Intimate Samples
The *CJPOA* has amended the definition and lists of intimate and non-intimate samples. This amendment has included ‘dental impression’ as ‘intimate samples’, and ‘saliva’ samples as well as ‘mouth-swabs’ as non-intimate samples.

(iii) Rules regarding Collection of Intimate Samples
Under this amendment:

- An intimate sample could be taken from an individual in police detention with the individual’s written consent, with such collection able to be authorised by a police officer of the rank of inspector.

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1236 *PACE Act* ss 62(2) and 63(4).
1237 *CJPOA* ss 54 and 55.
1238 A ‘recordable offence’ is largely any offence for which a person may receive a sentence of imprisonment and which are recorded on the national police records upon convictions. Cautions, reprimands and warnings can be given for such offences and a list of recordable offences is specified in the Schedule to the *National Police Records (Recordable Offences) Regulations 2000 (UK)* (SI 2000/1139) (as amended time to time); s 27(4) of the *PACE Act*, as amended by [61] of sch 8 to the *Crime and Disorder Act 1998* (‘CDA’), allows the Secretary of State to designate recordable offences, for further details see *National Police Records (Recordable Offences) Regulations (SI 2000/1139)*, preamble and reg 3.
1239 Intimate sample means:
(a) a sample of blood, semen or any other tissue fluid, urine or pubic hair;
(b) a dental impression;
(c) a swab taken from a person’s body orifice other than the mouth,
*CJPOA* s 58.
1240 The vast majority of DNA samples are regarded as ‘non-intimate’ samples for the purpose of the *PACE Act*. Section 65 of the *PACE Act*, as amended by *CJPOA* 58(3), defined the term non-intimate samples as:
(a) a sample of hair other than pubic hair;
(b) a sample taken from a nail or from under a nail;
(c) a swab taken from any part of a person’s body including the mouth but not any other body orifice;
(d) saliva;
(e) a footprint or a similar impression of any part of a person’s body other than a part of his hand.
1241 *CJPOA* s 58.
• While obtaining the sample, the police officer must have reasonable grounds to believe that the individual has been involved in a recordable offence and taking that sample can confirm or disprove his or her involvement.\textsuperscript{1243}

• If the authorisation is given by the police officer, the individual must be informed of the grounds for the authorisation.\textsuperscript{1244}

• In the instance of the intimate sample being a dental impression, the sample needs to be taken only by a registered dentist. Other intimate samples (other than a sample of urine) could be taken by a registered medical practitioner or a registered health care professional.\textsuperscript{1245}

• An intimate sample can also be taken from an individual who is not in police detention, if two or more non-intimate samples have already been taken but these were proved insufficient.\textsuperscript{1246}

• In case of intimate samples, an individual can decide not to consent ‘with due cause’ and this will be respected. However, if an individual refuses to give consent and such a refusal is deemed by police to be ‘without due cause’, the police must warn the individual that the refusal will be taken into account if the case goes to trial.\textsuperscript{1247}

(iv) Power of Police Regarding Collection of Non-Intimate Samples

The \textit{CJPOA} also changed the circumstances in which a non-intimate sample could be taken from individuals without appropriate consent:

• if he has been charged with a recordable offence, or he has been informed that he will be reported for such an offence; and

• if he has not had a non-intimate sample taken from him in the course of the investigation of the offence by the police; or

• if he has had a non-intimate sample taken from him, but either it was not suitable for analysis or, though so suitable, the sample proved insufficient.\textsuperscript{1248}

(v) Retention of Samples

\textsuperscript{1242} \textit{PACE Act} s 62(1) and (4), as amended by \textit{CJPOA} s 54.
\textsuperscript{1243} \textit{PACE Act} s 62(2), as amended by \textit{CJPOA} s 54.
\textsuperscript{1244} \textit{PACE Act} s 62(5), as amended by \textit{CJPOA} s 54.
\textsuperscript{1245} \textit{PACE Act} s 62(9) and (9A), as amended by \textit{CJPOA} s 54.
\textsuperscript{1246} \textit{PACE Act} s 62 (1A), as amended by \textit{CJPOA} s 54.
\textsuperscript{1247} \textit{PACE Act} s 62(10), as amended by \textit{CJPOA} s 54.
\textsuperscript{1248} \textit{PACE Act} 63(3A) and (3B), as amended by \textit{CJPOA} s 55.
Originally, under s 64 of the *PACE Act* DNA samples had to be destroyed if a person was not charged or was acquitted. However this section has been amended by the s 57 of the *CJPOA* and sub-s (3A) of s 64 provides that samples need not be destroyed if samples ‘were taken for the purposes of the investigation of an offence of which a person has been convicted’. As a result, the samples taken can be kept indefinitely.

(vi) Evaluation

Both intimate and non-intimate samples are useful for DNA extraction. The safeguards for collecting an intimate sample from an individual are greater than for the non-intimate samples because in case of an intimate sample, appropriate consent is required to obtain that sample from the individual. Currently non-intimate samples are most routinely sought by the police, because non-intimate samples can lawfully be taken from any person without consent, and also because the powers to take non-intimate samples have been significantly expanded. This amendment also allowed DNA samples to be kept indefinitely.

(c) Criminal Evidence (Amendment) Act 1997

The *PACE Act* was again amended, this time by the *Criminal Evidence (Amendment) Act 1997*. This amendment extended the powers of police and the categories of persons from whom non-intimate body samples may be taken without consent under Part V of the *PACE Act*.

While the amendment under the *CJPOA* allows for non-intimate samples to be taken without consent of the individuals convicted of a recordable offence, the *Criminal Evidence (Amendment) Act 1997* has further extended the power of police and permitted the taking of non-intimate samples from individuals convicted of certain

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1249 *PACE Act* s 64(3A), as amended by *CJPOA* 57.
1250 *PACE Act* s 62(1A), as amended by *CJPOA* s 54(2). Under s 54(2)(1A):
   An intimate sample may be taken from a person who is not in police detention but from whom, in the course of the investigation of an offence, two or more non-intimate samples suitable for the same means of analysis have been taken which have proved insufficient—
   (a) if a police officer of at least the rank of superintendent authorises it to be taken; and
   (b) if the appropriate consent is given.
1251 *PACE Act* s 63, as amended by the *Criminal Evidence (Amendment) Act 1997 (UK) c 17* (*‘Criminal Evidence (Amendment) Act’*).
1252 *Criminal Evidence (Amendment) Act* preamble.
sexual, violent and other offences prior to 10 April 1995 (as listed in Schedule 1 of the Act).1253

The said rule also applies to individuals detained as a result of an acquittal on the grounds of insanity or a finding of unfitness to plead for a recordable offence.1254 The Act of 1997 has, therefore, allowed for the retrospective application of provision of the CJPOA.

(d) Criminal Justice and Police Act 2001

The PACE Act was amended yet again in 2001 by the Criminal Justice and Police Act 2001 (hereinafter referred to as the CJPA). This is one of the most significant amendments regarding the circumstances in which samples could be retained.1255 Initially, under s 64 of the PACE Act, police were required to destroy DNA samples from people in the event of the person being acquitted (with such samples to be destroyed after the conclusion of the proceedings), or in instances where the charges were dropped or not proceeded with. (This included people found not guilty of a matter with which they had been charged).1256 However the amendment under the CJPA removed the obligation to destroy the DNA sample or profile even though there was no prosecution, or acquittal of any person arrested on suspicion.1257 The following rules were adopted under this 2001 amendment:

(i) Restriction on Use of Retained DNA Samples

- If DNA samples are ‘taken from a person in connection with the investigation of an offence’, such samples need not be destroyed;
- These DNA ‘samples may be retained even after fulfilment of the purposes for which they were taken; and

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1253 PACE Act s 63(9A), as amended by Criminal Evidence (Amendment) Act sub-ss 1(2) and (3).
1254 PACE Act s 63(3C), as amended by Criminal Evidence (Amendment) Act s 2.
1256 PACE Act s 64(1) and (2).
1257 CJPA s 82.
• During such retention, those samples shall not be used by any person other than purposes of the prevention or detection of crime, the investigation of an offence or the conduct of a prosecution.1258

(ii) Restriction on Destruction of DNA Samples (Retention of Samples)

• Samples are not required to be destroyed:
  • If they were taken for the purposes of the investigation of an offence for which a person has been convicted; and/or
  • If they were taken for the purpose of the same investigation of an offence and the person, from whom once such sample has been taken, has been convicted.1259

(iii) Voluntarily Given Samples Cannot Be Withdrawn
Where a person from whom a sample has been taken with written consents for its retention, that sample need not be destroyed and such consent once given are not capable of being withdrawn.1260

(iv) Speculative Searches
The said Act also authorised the police to conduct speculative searches of samples and expanded the scope of such searches to be conducted by a variety of law enforcement bodies in the UK and also by any person whose functions correspond to those of a police force in any country or territory outside of the UK.1261 This provision has apparently allowed NDNAD to be participated in an international DNA database scheme.

(v) Evaluation
The provision with regards to the retention of DNA samples was first adopted under the CJPOA (by amending the PACE Act) but with the condition of not using them in future investigations.1262 However, s 82 (2) of the CJPA of 2001 amended this

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1258 PACE Act s 64(1A), as amended by CJPA s 82(2).
1259 PACE Act s 64(3AA), as amended by CJPA s 82(4).
1260 PACE Act s 64(3AC), as amended by CJPA s 82(4).
1261 CJPA sub-ss 81 (1) and (2).
1262 PACE Act s 64(3A), as amended by CJPOA s 57.
provision (adopted under s 57 of the CJPOA), and removed this rule and allowed DNA samples to be retained and used for future investigations. That meant DNA samples could be retained even where charges were dropped or not proceeded with.

Though the CJPA repealed sub-s (3A) of s 64 of the PACE Act and changed the retention rule, some rules regarding the destruction of DNA samples under s 64(3) of the PACE Act remained unchanged. Thus samples that are taken from a person in connection with the investigation of an offence in circumstances where that person was not suspected of having committed the offence had to be destroyed after fulfilling the purposes for which they were taken. But the definition of an individual who ‘is not suspected of having committed an offence’ under s 64(3) is ambiguous. It is questionable whether this simply covered individuals whose samples were collected by the police from the scene of crime to solve potential contamination issues, or whether it covers individuals who volunteer in a mass DNA screening, who could arguably considered as ‘suspects’. Therefore, it is a vague and broad term and it possibly could be misused.

Moreover this provision applied retrospectively. It authorised the ‘continued retention of samples that should have been destroyed prior to entry into force of the Act, but were not destroyed’. The construction and expansion of the NDNAD have proceeded through these legislative changes. Finally, it can be argued that this legislation broadened the categories of suspects from which the police can take, retain and use samples to include those taken from innocent individuals. On this point, Paul Johnson, Robin Williams and Paul Martin argue that:

An inherent proposition of this legislative framework was that the database will hold the profiles of people who, in all other circumstances, are deemed to be innocent.

1263 PACE s 64(3A), as amended by CJPOA s 57.
1264 Section 64 of the PACE Act as first amended by s 57 of the CJPOA.
1265 PACE Act s 64(3).
1267 CJPA s 82(6). See also ibid.
1269 Johnson, Williams and Martin, ‘Genetics and Forensics’, above n 1126, 32.
(e) Criminal Justice Act 2003

The Criminal Justice Act 2003 (hereinafter referred to as the CJA) further amended some of provisions of the PACE Act. The 2003 Act again widened the police power of collection DNA samples. This amendment extended the police power by far the most when compared to the power that was allowed by the earlier amendments. Part 1 of the CJA contained some provisions regarding the forensic investigation and detection of crime so as to include the use of new technology in crime detection and prevention. Section 10 of the CJA amended s 63 of the PACE Act and inserted some new provisions. The following rule was adopted by this amendment:

(i) Taking Non-Intimate Samples without Consent

The amendment allowed the police to collect non-intimate samples from a person without the appropriate consent subject to the following two conditions:

- the person is in police detention as a consequence of his arrest for a recordable offence, and
- the sample must not be of the same type and such sample must not already have been taken from the same part of the body in the course of the investigation, or if it has been taken, it proved insufficient.

The amendment thus provided the police force with a wide range of powers to collect and retain DNA samples taken from persons without their consent, regardless of whether or not they had been charged with, or convicted of, a recordable offence. It meant that samples could be taken upon ‘reasonable suspicion’ for an offence, irrespective of whether the sample could prove guilt or whether it would be used in the investigation, and then allowed to be kept indefinitely on the NDNAD, where it could be later used in speculative searches. Not unsurprisingly, this resulted in ‘a jump in the number of DNA samples taken from individuals and stored on the NDNAD from around 800,000 in 1999–2000, to just under 4 million in the year

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1271 PACE Act sub-ss 63 (2A) and (2B), as amended by CJA s 10(2).
1272 PACE Act sub-ss 63 (2A) and (2B), as amended by CJA s 10(2).
1273 PACE Act s 63 (2C), as amended by the CJA s 10(2).
It gave the NDNAD the right to retain the most extensive database of people’s DNA samples and profiles in the world. No other country’s police force had greater freedom and power to obtain, use and store genetic information from its citizens.\textsuperscript{1275}

(f) Serious Organised Crime and Police Act 2005

(i) Original Situation
Prior to 7 April 2005, the use of NDNAD was limited for purposes detailed under s 64 of the \textit{PACE Act}. Therefore, the database could be used to help identify a victim where death was assumed to be as a result of a crime. However, where a person had died of a natural cause — such as a heart attack or as the result of a natural disaster (for example, the tsunami in South East Asia at the end of 2004), the circumstances are not covered by this legislation.\textsuperscript{1276} It meant that NDNAD was not permitted to use to identify a deceased person’s or disaster victims and so on).

(ii) Amended Situation
On 7 April 2005, this situation was changed through the implementation s 117(7) of the \textit{Serious Organised Crime and Police Act 2005} (hereinafter referred to as the \textit{SOCPA}), which amended s 64 of \textit{PACE Act}.\textsuperscript{1277}

\textit{Identification of Deceased Persons Who Have Died of Natural Causes}: This amendment enabled DNA profiles from DNA samples which have been taken from a deceased person to be checked against the database for identification purposes, irrespective of whether there is any suspicion of their involvement in a crime.\textsuperscript{1278} As a result, disparity has removed in regard to the circumstances in which the databases may be used to help identify a deceased person, as it now includes those who may

\begin{footnotesize}

\textsuperscript{1275} Gene Watch UK, \textit{A Brief Legal History of the NDNAD} , above n 1233.


\textsuperscript{1277} \textit{PACE Act} s 64(1A), as amended by the \textit{Serious Organised Crime and Police Act 2005 (UK) c 15}, s 117(7) (‘\textit{SOCPA}’).

\textsuperscript{1278} HM Government, \textit{Serious Organised Crime and Police Act 2005}, above n 1276, 52 [261].
\end{footnotesize}
have died of natural causes. This amendment broadened the scope of uses of the retained DNA samples and information, allowing them to be used for the identification of deceased persons or persons from whom a body part came, whether or not any criminal offence is suspected of being involved.

*Intimate and Non-Intimate Samples:* Section 119 of the *SOCPA* amended s 65 of the *PACE Act*, providing clearer definitions of ‘intimate’ and ‘non-intimate swabs’. It has also further extended the scope of these types of samples adding some more biological samples to the list. In a case of sexual assault, this may include ‘swabs of the coronal sulcus, shaft or glans of the penis’ of a male suspect and ‘[perineal] or vulval swabs and swabs from matted pubic hair from a female victim or suspect’. These types of samples had fallen outside the definition of an intimate sample. The amendment not only increases the number and types of intimate samples but clearly states that intimate samples require consent prior to collection (and such consent must be in writing). This process avoids ‘any possible allegation of assault against the police if they decide they need such a swab to be taken in the course of an investigation and it gives added protection to the rights of the suspect’.

**(g) Counter-Terrorism Act 2008**

In order to ‘confer further powers to gather and share information for counter-terrorism and other purposes’ and also to provide additional power to police to take DNA samples from person subject to a control order, the *Counter Terrorism Act 2008* (hereinafter referred to as the *CTA*) has been passed. With regards to collection and use of DNA sample the following amendments has been made:

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1279 Ibid 52 [261], [263].
1280 ‘A swab taken from any part of a person’s genitals (including pubic hair) or from a person's body orifice other than the mouth’: *PACE Act* s 65, as amended by *SOCPA* s 119.
1281 ‘A swab taken from any part of a person’s body other than a part from which a swab taken would be an intimate sample’, *PACE Act* s 65, as amended by *SOCPA* s 119.
1283 Ibid 53–4 [267]–[268].
1284 *Counter-Terrorism Act 2008* (UK) c 28 preamble (‘CTA’).
1285 *PACE Act* s 63(3D), as amended by *CTA* s10(2).
(i) Extended Police Powers to Allow DNA Samples to Be Taken from Persons Subject to Control Orders

Section 10(2) of this Act provided that ‘a non-intimate samples may be taken without the appropriate consent of an individual subject to a control order’.\(^{1286}\) Control order has been defined as ‘an order against an individual that imposes obligations on him for purposes connected with protecting members of the public from a risk of terrorism’.\(^{1287}\) Moreover the term ‘appropriate consent’\(^{1288}\) is defined in s 65 of \textit{PACE Act}. In terms of the level of force able to be used to obtain a sample, the Code of Practice for the Identification of Persons by Police Officers ‘(PACE Code D) provides that ‘a constable can use reasonable force to ensure compliance with this provision where the appropriate consent is withheld’.\(^{1289}\)

(ii) Retention and Use of DNA Samples from Persons Subject to Control Order

This legislation also allows the retention and use of DNA samples collected from individuals who are subject to control orders.\(^{1290}\) This Act also provides some safeguards in ss 64(1AA) and (1AB) of \textit{PACE Act} (as amended by ss 10 and 14 of the \textit{CTA} and such retention and use of DNA sample must be done subject to such safeguards. These safeguards ensure that any such samples (which are retained) could be used for purposes related to ‘the interests of national security, the prevention or detection of crime, the investigation of an offence, the conduct of a prosecution or the identification of a deceased person or of the person from whom the material came’.\(^{1291}\) These sections refer to people subject to control orders that restrict a number of rights and impose a number of obligations on them ‘for purposes connected with protecting members of the public from a risk of terrorism’.\(^{1292}\) Section 14 of the \textit{PACE Act} also led to a further increase in the number of

\(^{1286}\) \textit{PACE Act} s 63(3D), as amended by the \textit{CTA} s 10(2).
\(^{1287}\) \textit{Prevention of Terrorism Act 2005} (UK) c 2, ss 1, 7(8) (‘\textit{PTA}’). This definition is also covers its use in the \textit{CTA}, for further detail see \textit{CTA}, s 10(5).
\(^{1288}\) The term ‘appropriate consent’ means ‘(a) in relation to a person who has attained the age of 17 years, the consent of that person; (b) in relation to a person who has not attained that age but has attained the age of 14 years, the consent of that person and his parent or guardian; and (c) in relation to a person who has not attained the age of 14 years, the consent of his parent or guardian’: \textit{PACE Act} s 65.
\(^{1290}\) \textit{PACE Act} sub-ss 64(1AA) and (1AB), as amended by the \textit{CTA} ss 10(4) and 14.
\(^{1291}\) \textit{PACE Act} sub-ss 64(1AA) and (1AB), as amended by the \textit{CTA} ss 10(4) and 14; see also legislation.gov.uk, \textit{Counter-Terrorism Act 2008}, above n 1289, [49].
\(^{1292}\) \textit{Prevention of Terrorism Act 2005} (UK) s 1(1). See also ss 1(2)–(10).
individuals on the NDNAD since it has the capacity to link the NDNAD to databases held by the security service (MI5) and the Secret Intelligence Service (MI6 or SIS) on the grounds of national security.

(iii) DNA Samples that are Held by the Law Enforcement Authority in the Course of Surveillance

When any material (that is, DNA samples) are obtained by a law enforcement authority in the course of surveillance (which are not covered by the existing statutory restrictions that is ss 63A and 64 of the PACE Act, for the purpose of current discussion), such samples may be retained and used by that authority in the interest of national security. Therefore, the CTA has extended again police powers to allow DNA to be taken from persons subject to control orders and also to be collected from persons during any authorised secret surveillance and retained such sample indefinitely.

5.1.6.7 Evaluation

Although the UK legal system has been subject to unprecedented legislative developments in the field of forensic use of DNA data, there remain some problems. For instance, the amendment of s 10 of the CJA has changed ‘the taking of non-intimate samples, but in a rather confusing way’ as it ‘seems to create two circumstances, that are not mutually dependent on each other’.

Section 63 of the original PACE Act provided that a non-intimate sample may be taken without consent in two situations: firstly, if the individual is in police detention or is being held in custody by the police, and an officer of at least the rank of inspector has authorised it. Secondly, this officer may only give an authorisation for taking the

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1293 PACE Act s 63A (1), as amended by the CTA s14 (2); see also legislation.gov.uk, Counter-Terrorism Act 2008, above n 1289, [47].
1294 PACE Act sub-ss 64(1AA) and (1AB), as amended by the CTA ss 10(4) and 14.
1296 PACE Act ss 63(3D), 63A(1) and 63A(6A), 64(1AA), as amended by the CTA s 10.
1298 PACE Act s 63(3)(a).
1299 PACE Act s 63(3)(b), as amended by CJA s 81. Section 63(3) and (4) of the PACE Act provides, ‘the officer are allowed to give such authorisation if he has reasonable grounds to suspect that the person is involved in a recordable offence, and the officer also believes that the sample will confirm or disprove his involvement’.

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sample, where he suspects the involvement of the individual in a recordable offence, and he believes the sample will prove or disprove their involvement.\footnote{1300}{PACE Act s 63(3) and (4).}

However, the new \textit{CJA} provision\footnote{1301}{CJA s 10(2).} states that a non-intimate sample may be taken from an individual \textit{without} the appropriate consent if two new conditions are satisfied: namely (1) the individual is in ‘police detention in consequence of his arrest for a recordable offence’; and (2) a sample of the same type and from the same part of the body has not already been taken, or if it has been taken, it proved insufficient. Under the original provision non-intimate samples may be taken without consent from a person arrested for a recordable offence, where an inspector approves it, but under the amendment this oversight is not mandatory. It has eliminated the requirement for the oversight of the inspector in regard to obtaining a DNA sample without consent, yet no reason has been supplied for the change which clearly broadens the capacity for taking such samples.

Moreover, the expansion of the DNA database to incorporate individuals merely arrested (not charged or convicted of any offence) for recordable offences rather than ‘serious arrestable offence[s]’ has led to allegations that the UK Government is building a National DNA Database by stealth and avoiding all open debate on such controversial policy.\footnote{1302}{Privacy International, \textit{UK DNA Database to Grow Dramatically Under the Criminal Justice Act 2003}, above n 1297.} Subsequently, these significant legislative advances have been challenged in the case of \textit{S and Marper v the United Kingdom} where the ECtHR decided that the retention of S and Marper’s DNA breaches human rights law.\footnote{1303}{S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008).} In response to that case decision, the Government has indicated an intention to amend the law and the UK Home Office has undertaken a consultation namely, ‘Keeping the Right People on the DNA database: Science and Public Protection’ with a view to set out the future framework for retention, destruction and governance of DNA data.\footnote{1304}{UK Home Office, ‘Keeping the Right People on the DNA Database’, above n 12, 5.} However, the Commissioner of Police of the Metropolis decided to continue to apply the existing policy on the retention of DNA and fingerprints until such time as the law was changed.
On 11 November 2009, after the consultation period had ended, the Secretary of State made a written ministerial statement outlining a revised set of proposals. It was decided to include these proposals in the *Crime and Security Act 2010*. The Act received the Royal Assent on 8 April 2010, but some relevant provisions have not been brought into effect. Following a change of government in May 2010, rather than bringing this Act into force, the government announced its proposal for new legislation designed essentially to mirror the Scottish system and finally the Protection of Freedoms Bill 2011 has been introduced in the House of Commons as recently as 11 February 2011 and by November had been placed before the House of Lords after its Third Reading in the House Of Commons (11 October 2011) and its Second Reading in the House of Lords occurred on 8 November 2011, where it remains.

In the meantime, in the case of *R (on the application of GC) (FC) v the Commissioner of Police of the Metropolis* and *R (on the application of C) (FC) v the Commissioner of Police of the Metropolis*, when the applications of both GC and C to have their fingerprints and DNA data deleted from police records were refused by Police Commissioner. They (both GC and C) issued proceedings for judicial review of the retention of their data on the grounds that, in the light of the *Marper case*, its retention was incompatible with their rights under Article 8 of the *ECHR*. In the circumstances, the Divisional Court (Moses LJ and Wyn Williams J) dismissed the applications for judicial review and granted a certificate that the cases were appropriate for a leapfrog appeal to the Supreme Court. Two difficult issues were raised before the Supreme Court:

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1305 *CSA*.
1306 *CSA* ss 14, 22 and 23.
1311 Ibid [70], [76].
• *Firstly*, should the court issue a declaration of incompatibility under s 4\textsuperscript{1312} of the *Human Rights Act 1998*? This issue rested principally on whether s 64(1A)\textsuperscript{1313} of the *PACE Act* requires an act of this nature, or whether that section could be interpreted so as to permit an act which was compatible with Article 8 of the *ECHR*.

• *Secondly*, if the Court decided that s 64(1A) could be interpreted compatibly with Article 8 of the *ECHR*, should it order the ACPO to revise its guidelines\textsuperscript{1314} or should it simply issue a declaration that the current scheme was unlawful and leave the resolution of the matter to Parliament?

The Supreme Court, by a majority, allows the appeals (Lords Rodger and Brown dissenting). Lord Dyson gave the lead judgment. The majority granted a declaration that the present ACPO guidelines are unlawful because they are incompatible with Article 8 of the *ECHR*\textsuperscript{1315} Lord Dyson further argued that:

> It is important that, in such an important and sensitive area as the retention of biometric data by the police, the court reflects its decision by making a formal order to declare what it considers to be the true legal position. But it is not necessary to go further. Section 8(1) of the *HRA* gives the court a wide discretion to grant such relief or remedy within its powers as it considers just and appropriate. Since Parliament is already seized of the matter, it is neither just nor appropriate to make an order requiring a change in the legislative scheme within a specific period.\textsuperscript{1316}

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\textsuperscript{1312} S 4(2) says, ‘If the court is satisfied that the provision is incompatible with a Convention right, it may make a declaration of that incompatibility.’

\textsuperscript{1313} ‘By this amendment it provided and conferred on the police the power to retain biometric data on suspects who have been acquitted or, indeed, not even prosecuted’, for further details see Mathew Purchase Matrix, *Case Comment: R (GC) v The Commissioner of Police of the Metropolis; R (C) v The Commissioner of Police of the Metropolis [2011] UKSC21* (3 June 2011) UK Supreme Court Blog <http://ukscblog.com/case-comment-r-gc-v-the-commissioner-of-police-of-the-metropolis-r-c-v-the-commissioner-of-police-of-the-metropolis-2011-uksc21>.

\textsuperscript{1314} The Association of Chief Police Officers (ACPO) guidelines (which published on 16 March 2006) provides, ‘Chief Officers have the discretion to authorise the deletion of any specific data entry on the Police National Database but this discretion should only be exercised in exceptional cases. Exceptional cases will by definition be rare’.


\textsuperscript{1316} *R (On the Application of GC and C [2011] UKSC 21*(18 May 2011) [46].
Therefore, the court granted no other relief\textsuperscript{1317} and left the matter to be decided by the government and parliament. At present, the Protection of Freedoms Bill 2011, which mirrors the Scottish system, has undergone its Third Reading in the House of Commons and is before the House of Lords.\textsuperscript{1318} It is thus argued that current legislative mechanisms have provided extensive power to UK police, so much so that the above legislation was introduced to define and protect freedoms in the UK and provide greater certainty.

Further, because of the various Acts and their amendments over time, it is difficult to protect human rights and privacy with regards to someone’s DNA data judicially. As a result, even after the \textit{Marper} judgment, cases like those of GC and C were prosecuted in the UK domestic court even though they dealt an issue similar to that of the \textit{Marper case}. No new rule or precedent protecting human rights and individual privacy was announced because of the disputed legislative provisions. After discussing the legislative bases for the DNA database management (sample collection, storage and retention) as a whole, the following section will examine the DNA sample and profile collection, storage and retention policy as well as mechanism.

\textbf{5.1.6.8 NDNAD DNA Sample-Profile: Collection, Storage and Retention}

Implementing a forensic DNA database involves a number of steps, such as DNA sample collection, storage and retention. The whole process is strongly influenced by different factors, such as the legal system of the respective country in which it is situated, and the nature of their DNA laboratory, both of which vary between countries. It also depends on the political, economic, social and cultural background of the country implementing the database. All these factors affect the possibility of obtaining DNA samples from suspects, the storage and period of retention of DNA samples and profiles for the purpose of case investigation. There are, for example, significant differences between and among the European countries regarding the criteria used to enter a person onto the database. For instance, profiles of suspects are entered in five countries, namely, Germany, Austria, Finland, Denmark, and

\textsuperscript{1317} Supreme Court of the United Kingdom, \textit{Press Summary}, above n 1315. See also \textit{R (On the Application of GC and C [2011] UKSC 21(18 May 2011) [52].}

Switzerland, whereas a separate court order is required in order to obtain a sample (even from convicted offenders) in Belgium, Germany, the Netherlands, and Norway.\textsuperscript{1319} There are also differences in relation to the destruction rule or removal criteria, and retention policy in the continental EU countries.\textsuperscript{1320}

For instance in some EU member states (for example, Cyprus, the Czech Republic, Finland, France, Hungary, Luxemburg, Scotland, Slovakia and the Netherlands), the records have to be destroyed after acquittal or when the charges have been dropped against suspects. In case of Austria, it requires suspects to submit a written request for sample destruction after they are acquitted.\textsuperscript{1321} Some member states pursue the policy of immediate destruction of all samples (for example, Germany, Lithuania, Sweden and Belgium).\textsuperscript{1322} Regarding the DNA data of convicted offenders, some member states (for example, Cyprus, the Czech Republic, Finland, France, Hungary, Luxemburg, Scotland, Slovakia and the Netherlands) allow for their retention for a substantial period of time.\textsuperscript{1323} In France, the profiles are retained either for 40 years after the sentence has been passed or until the convicted offender reaches the age of 80 years.\textsuperscript{1324} Another group of member states retains the DNA samples of both suspects and convicted offenders for a certain period of time. In the case of Denmark, for instance, DNA profiles of convicted offenders and crime suspects must be retained in the database until two years after the passing away of that person concerned, or it must be retained until when the person concerned reaches the age of 80 years).\textsuperscript{1325} The UK, on the other hand allows indefinite retention of DNA samples and profiles.

\textsuperscript{1320} Ibid 233.
\textsuperscript{1322} Camp and Dierickx, ‘The Retention of Forensic DNA Samples’, above n 1321; see also Van Camp and Dierickx, ‘National Forensic DNA Databases’, above n 308, 97; Schneider and Martin, ‘Criminal DNA Databases’, above n 1319, 233.
\textsuperscript{1323} Camp and Dierickx, ‘The Retention of Forensic DNA Samples’, above n 1321; see also Van Camp and Dierickx, ‘National Forensic DNA Databases’, above n 308, 97; Schneider and Martin, ‘Criminal DNA Databases’, above n 1319, 233.
\textsuperscript{1324} Van Camp and Dierickx, ‘National Forensic DNA Databases’, above n 308, 94, 96.
\textsuperscript{1325} Ibid 42–3; see also Schneider and Martin, ‘Criminal DNA Databases’, above n 1319, 233.
As can be seen from the above, the national legislation and policies regarding practices of sample collection, retention periods, and data entry and removal criteria for regulating forensic DNA databases of EU countries, in some cases, differ significantly from those of the UK. 1326 (It should also be noted that there are some differences between the legislation of England/Wales and Scotland, which have separate parliaments.) The UK (England and Wales) is the only country which has pursued a policy of indefinite retention of DNA samples and profiles; and, therefore, the NDNAD is only the database which follows this unique policy.

The following section will analyse the NDNAD’s collection, storage and retention mechanisms which differs from other countries in many respects.

(a) Collection

The successful collection of DNA material depends upon the search methods and also state of the crime scene/s. 1327 DNA samples for the NDNAD are collected from different sources, such as:

**Criminal Justice (CJ) Sample**1328 or Subject Profile

When biological or DNA samples are collected from suspects ‘following arrest for a recordable offence,’1329 they are referred to as ‘criminal justice (CJ) samples’. The police first check the Police National Computers (PNC) to see whether the individual’s DNA profile is already on the NDNAD, and also ensure that a fresh sample is not collected if an existing profile is confirmed. The police keep their own record of ‘arrested persons who have given a sample on the PNC database’ with ‘[e]ach police record ... given an Arrestee Summons Number (ASN)’.1330 The profile that derives from CJ samples (that is, those taken from suspects following arrest for a

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1327 Goodwin, Linacre and Hadi, above n 207, 20.
1329 NPIA, ‘National DNA Database Annual Report’, above n 1145, National Policing Improvement Agency (NPIA), 'National DNA Database Annual Report' (2007–09)10; see also House of Lords Select Committee on Science and Technology, above n 1128, [4.23].
1330 Staley, above n 275, 15.
recordable offence) is called a ‘Subject Profile’. As at 31 March 2009, some 5 617 604 subject profiles had been retained on the NDNAD.1331

Scene of Crime (SOC) Sample and Profile1332
While investigating a case, the police collect a range of samples (such as, hair, blood, semen, urine, and saliva) from the scenes of crime (SOC) with the expectation of obtaining a DNA profile for the offenders. These samples are analysed in the forensic laboratory in order to create such profiles. SOC samples go through the same set of steps as CJ samples in order to be placed in the database. The NDNAD 2007–2009 annual report noted that since 1995, 5 56 794 crime scene profiles had been placed on the NDNAD,1333, and that ‘as at 31 March 2009 350,033 crime scene profiles were retained on the database’, some 53 000 having been removed at the request of police during 2007–2009 following a conviction for an offence or a decision that the matter will not be pursued further.1334

Volunteer Samples and Profiles
The term ‘volunteer’ has been defined by the Willis and Willmott. It includes ‘those who offer a sample for elimination purposes in an intelligence-led investigation’.1335 Generally when DNA samples are provided voluntarily by individuals in a police investigation for inserting their profile in the database for comparison purposes, their entries are known as ‘volunteer profiles’. There are various sources of volunteer samples; however, most volunteer samples are obtained from victims, innocent third parties in the process of mass screening, or persons who have voluntarily come forward to donate their samples.1336 As at 31 March 2009, the total number of volunteer samples was 36 093.1337

Samples from Child Offenders
According to the provisions of the PACE Act 1984, DNA profiles from children under the age of 10 years could be added to the NDNAD but only with the consent of

1332 Ibid 22–5.
1334 Ibid 25.
1335 Willis and Willmott, above n 1232, [1.3].
1337 Ibid.
their parent or guardian. On 16 December 2008, however, the Home Secretary announced that DNA profiles of all children under 10 years of age were to be removed from the NDNAD. Following the Home Secretary’s announcement, the profiles from all the children under 10 years were removed and deleted from the NDNAD. The final profile taken from a child under 10 years was removed from the NDNAD on 5 March 2009. As at March 2009, 11.7 per cent of those on the database were aged between 10 and 15 years old, and 9.0 per cent between 16 and 17 years of age at time of loading were on the NDNAD. As at 31 March 2009, in terms of their current age 2.3 per cent of those on the database are between 10 and 15 years of age, and 3.7 per cent are from 16 to 17 years of age.

Methods of collecting DNA samples, therefore, vary depending on the types of sample (SOC sample, CJ sample or volunteer’s sample). Most often a sample is obtained via a buccal swab or where a large cotton wool bud is rubbed inside the suspect’s cheek to loosen and collect skin cells. Alternatively, ten hairs with roots bulbs attached ‘can be removed from the head’. The police force is authorised under the PACE Act to collect DNA samples. The amendments and the additional new legislation (that is, the CJPOA, the CJPA, the CJA) have expanded various powers of police — defining the classes of people from whom samples and profiles can be collected and also what types of samples can be collected and the method of collection.

(b) Storage and Analysis

The storage of DNA sample and/or profile is another important issue; it is possible to choose either the storage of only the DNA profiles or the samples, or both. The exact conditions for storage of the samples depend on the nature of the samples and the environment. Generally samples collected for DNA analysis are stored at low temperature and humidity in order to avoid or slow its rate of degradation or

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1338 Ibid 21; see also Wallace, 'Prejudice, Stigma and DNA Databases', above n 12, [6].
1339 While this is correct for the UK NDNAD, Scotland and Northern Ireland have their own databases and the legislation in Scotland differs so that younger aged persons are on their data base but not uploaded onto the NDNAD whereas profiles of older persons may be: NPIA, ‘National DNA Database Annual Report’, above n 1145, 21.
1341 Staley, above n 275, 15.
1342 For further details see section 5.1.5.6 of this Chapter; see also Jane Kaye, above n 1139.
1343 Corte-Real, above n 394, S144.
contamination as a cool, dry environment limits the action of bacteria and fungi.\textsuperscript{1344}

The storage process of DNA sample on the NDNAD usually begins at a police station when an officer takes a tissue sample from a newly arrested person. If an individual’s DNA profile is not on the NDNAD, the police start the following storage process and the process is repeated so that there are two samples for each suspect:

- The police keep their own record and each police record is given an Arrest Summons Number (ASN). The ASN allows information on the NDNAD to be linked with information on the Police National Computer (PNC).\textsuperscript{1345}

- Sample tubes are labelled with a unique barcode sticker, then placed into a special tamper-proof, clear plastic bag, together with card with the same barcode label and other details\textsuperscript{1346} related to this sample.

- The bag is then sealed and the samples are sent to an accredited DNA profiling laboratory for processing, where staff check the integrity of the tamper-proof bag and the card details, entering the information on a computer system.\textsuperscript{1347} There are currently five approved laboratories\textsuperscript{1348} or organisations that are authorised to supply DNA profiles to the NDNAD.

- Staff from the laboratory’s sample reception unit checks the integrity of the tamper-proof bag and, before opening it, they also check whether all the required details have been entered the accompanying card. A scanner ‘is used to record the details of each sample onto the computer system’\textsuperscript{1349}

- One of the two samples submitted from each individual is kept frozen by the laboratory that undertakes the analysis. This ‘back up’ sample is kept ‘until the person would have reached the age of 100 if no further information is obtained about them’. If the person’s death is confirmed, however, that person’s sample is only kept for a further 12 months before it is destroyed.\textsuperscript{1350}

\textsuperscript{1344} Goodwin, Linacre and Hadi, above n 207, 23–4.
\textsuperscript{1345} ‘The PNC consists of linked databases holding extensive data on criminals, vehicles and property. There is also a “Barcode Reference Number” (BRN) which allows information on the NDNAD to be linked with the corresponding DNA sample’, Staley, above n 275, 14.
\textsuperscript{1346} ‘The suspect’s name and age, the type of alleged crime, the date the sample was taken and the name, number and rank of the officer taking the sample’ : ibid 16.
\textsuperscript{1347} Ibid.
\textsuperscript{1348} Three public laboratories (the FSS in England, and the Strathclyde and Tayside Police laboratories in Scotland); and two private companies (Cellmark and LGC Limited), ibid.
\textsuperscript{1349} Ibid.
\textsuperscript{1350} Ibid.
• ‘The other sample is processed for analysis in order to obtain a DNA profile. The DNA is first extracted from the tissue. It is then amplified in a heating and cooling process that creates millions of copies of the original DNA — like a biological photocopier’.\(^{1351}\) This process is known as the polymerase chain reaction (PCR).\(^{1352}\) The PCR technique ‘produces a string of numbers which is the DNA profile and such profile is sent to load onto the NDNAD’.\(^{1353}\)

Forensic organisations then store samples on completion of the DNA analysis, and ‘retain a record of the derived profiles for use in the specific case or related investigations’.\(^{1354}\) Legislation gives police the authority to collect DNA samples, which are then given to the FSS for the construction of reference profiles that are deposited in the NDNAD’.\(^{1355}\)

(c) Retention and Removal

Another important but related issue is for what period individuals’ DNA profiles and other personal information should be retained on databases? Most countries with DNA databases keep the DNA profiles of people who have committed serious crimes (such as rape and murder) on the database for defined period, but there are a wide variety of criteria for entering and removing people who are convicted of less serious crimes (as discussed above).

When NDNAD was first created, DNA profiles, samples and police computer records were legally required to be deleted and destroyed when someone was acquitted or where charges against them were dropped. However, the amendment to, and the insertion of ss 64(1A) and (1B) into, the *PACE Act*\(^{1356}\) allowed samples to be retained indefinitely, even if an individual were acquitted or released from prosecution. Section 64(1A) of the *PACE Act* does not specify any timeframe for the retention of the data or any procedure to regulate its destruction. Such provision

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\(^{1351}\) Ibid.

\(^{1352}\) The PCR process has been described in Section 2.1.3 3(ii) of Chapter 2.

\(^{1353}\) Staley, above n 275, 16.

\(^{1354}\) NPIA, ‘National DNA Database Annual Report’, above n 1145, 41.

\(^{1355}\) Jane Kaye, above n 1139, 17.

\(^{1356}\) *CIPA 2001*, s 82 (1A) of the; see also *PACE Act 1984*, sub-ss 64(1A) and (1B).
appears intended to introduce a database with a power to indefinitely retain DNA samples and profiles.

(d) Access
It seems a reasonable requirement that only ‘authorised persons’ should be allowed to access the database or the information; however, in practice there are various different possibilities regarding who should have the right to access such material, and almost every country has framed its own database access policy due to a number of different factors. Each policy has its own merits, depending on the overall legal and judicial system of that country, but it is generally accepted that the chances of abuse of DNA information, particularly the violation of privacy, increases in proportion to the number of persons who are allowed to access.\(^{1357}\)

In the case of the NDNAD, access to the information in the database has been strictly limited to a small number of people authorised by the NDNAD custodian.\(^{1358}\) This comprises a small number of employees of the NDNAD Delivery Unit and the FSS (approximately 30 staff in total), all of whom have the necessary security clearance. The *PACE Act* has made it clear that DNA data stored on the NDNAD can only be used for purposes related to preventing, detecting, and prosecuting crime, or ‘identifying deceased persons or body part’.\(^{1359}\) In addition, the forensic science organisations have been issued with strict guidelines relating to the handling of samples and profiles in their possession; however, if a forensic science organisation wishes to consider making use of the samples or DNA profiles for any other purposes, such as research, they first must submit a proposal to the NDNAD Strategy Board\(^{1360}\) for consideration. The NDNAD Strategy Board then assesses each proposal ‘on its merits’ and seeks ‘further independent advice ... from the Ethics Group’.\(^{1361}\) Strict control is to be maintained at all times in regard to the release of

\(^{1357}\) Van Camp and Dierickx, ‘National Forensic DNA Databases’, above n 308, 26.
\(^{1358}\) Postnote, above n 343, 2.
\(^{1359}\) NPIA, ‘National DNA Database Annual Report’, above n 1145, 38. See also the *SOCPA 2005*.
\(^{1360}\) ‘In the first instance, requests are made to the Custodian of the NDNAD who provides the Board with details of the request together with the Custodian’s observations on the merits of the request for the Board to consider’, National Policing Improvement Agency (NPIA), ‘National DNA Database Annual Report’ (2007–09), 40.
any information. In the period from the NDNAD’s establishment in 1995 to 31 March 2009, 46 requests for access to samples or data for research and development purposes have been made. The release of samples or data as a result of such request is considered on a case by case basis. Of those requests, 26 have been approved, 18 have been rejected and two were still being considered at that date. This access policy (that is, for use of DNA samples and profiles in the NDNAD) is, therefore, subject to some relevant legal and ethical constraints.

Further, under the NDNAD policy, members of the police force are not allowed to directly access the NDNAD. Any kind of information about the profile matching is provided by the NDNAD Delivery Unit. The UK police force can, if there is no match on the NDNAD, seek to access samples from existing collections held by other parties (for example, health and research related collections) by virtue of an access order issued by the court. The sample provider in these instances has no role in determining whether such use eventuates.

5.1.6.9 Uses and Benefits of the NDNAD

In terms of value for crime detection and prevention, ‘[o]ne of the most salient aspects of the NDNAD is its capacity to enact an automated and continuous series of searches of all new database entries against SOC and CJ profiles already on the database’. The size of the NDNAD is increasing day by day with samples from innocent people (such as those supplying samples at mass suspect elimination screenings) as well as from convicted criminals. It was estimated that as at 31 March 2009, a DNA profiles of some 4 859 934 individuals were held on the NDNAD, representing an 11 per cent increase on the previous year. Although the administration of the database requires a huge investment both in terms of staff and equipment, it is useful in many respects, including as a cost effective measure that

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1363 Ibid 38–9.
1364 Ibid.
1365 Jane Kaye, above n 1139, 23–4.
1366 Ibid.
accurately identifies offenders and saves investigative time. Highlighting the benefits of NDNAD, the Home Office noted:

The National DNA Database is a key police intelligence tool that helps to quickly identify offenders, make earlier arrests, secure more convictions and provide critical investigative leads for police investigations.

Since its inception in 1995, NDNAD has successfully detected a number of offenders, enabling them to appear before the court. It has been instrumental in securing their conviction and, ultimately, their punishment. There are several realistic benefits of the NDNAD, some of which are going to be discussed below.

(a) An Enhanced Tool for the Proper Administration of Justice

Advantages of the NDNAD include minimising risk of innocents being subject to police investigation, its use where no eye witness is available, and its low error rate. Further, a guilty plea induced by the existence of DNA evidence will avoid the trauma of court appearance for witnesses and victims and diminish the scope for witness intimidation. Retention of samples and profiles on the database is not only helpful in quality assurance programmes, it can allow ‘future challenges to errors in the original DNA profiling; and ... allow re-profiling in the event of scientific advances’.

(b) Familial Searching

One of the important aspects of NDNAD is ‘familial searching’. Familial searches allow the police to identify a suspect who left a crime scene sample and whose details are not on the NDNAD, but who can, nevertheless, be traced through the profiles of family members whose details are already on the database. This can occur by looking for partial matches between SOC profiles and the NDNAD profiles.
Even if an individual has not provided a sample on the NDNAD, the database can become a means of identifying those who are relatives (whose samples are on the database) of a person whom the police is seeking in regard to a criminal offence due to the shared, inherited nature of DNA and through that information attempt to locate the suspect. This is possible due to the fact that close blood relatives share much of the same DNA coding. Investigators are using this method for solving criminal cases in the UK and it is now an established practice in regard to the NDNAD. Bob Hepple in his article identified that there were 78 familial searches alone in 2005 in the UK.

(c) Cold Cases

The advent of PCR-based techniques have made it possible to obtain DNA profiles from old case samples and it will be helpful to resolve ‘cold cases’, that is, cases that have previously been closed. The application of low copy number (LCN) PCR has further increased the chance of obtaining DNA profiles from highly degraded material. Cases that could not be resolved and have remained open from dates prior to the introduction of DNA typing can now be re-examined using either standard DNA testing or LCN in combination with the NDNAD. The use of the new technology ‘has allowed numerous cases to result in a conviction and therefore closure’. 

(d) Speculative Searching


World of Forensic Science has defined the term cold cases as: A ‘cold case’ is any criminal investigation by a law enforcement agency that has not been solved for (generally) at least one year and, as a result, has been closed [to] further regular investigations. A cold case may be closed for various reasons such as: previously available technology was not able to adequately analyse the evidence in order to form a conclusion; witnesses were hostile and uncooperative; various time constraints hindered the investigation; the originally assigned detectives had a heavy workload; a lack of worthwhile leads stalled the case, ... violent crimes such as homicides and sexual assaults are well matched to being reopened as cold case reviews because such cases generally produce the most evidence, E-Notes — World of Forensic Science, Cold Case (1 November 2011) <http://www.enotes.com/forensic-science/cold-case>.

Goodwin, Linacre and Hadi, above n 207, 101.
A ‘speculative search’\textsuperscript{1380} is ‘a search that is carried out when DNA samples are submitted to the DNA database laboratory and they are compared against all other samples held’.\textsuperscript{1381} There is wide legislative provision covering this area. Generally, in case of some unsolved crimes, speculative searches are conducted using the NDNAD. People voluntarily provide their DNA samples and also give consent to have their sample stored permanently. Accordingly, their profiles are loaded onto the NDNAD and then it is used in speculative searches for the indefinite future.\textsuperscript{1382} The speculative searches are carried out either in case of convicted person’s sample (also known as CJ sample) which is received for the first time and then it is compared against all other samples held on the database, or in case of undetected crime scenes, when DNA sample (also known as database sample) are compared against the person in the database, to identify matches. Database samples are also compared against other detected crimes on the database, to identify linked offences.\textsuperscript{1383}

(e) Fight against Terrorism

The use of DNA is also significant in the ‘fight against terrorism’. The \textit{Prüm Treaty} was signed on 27 May 2005 by seven EU countries\textsuperscript{1384} who agreed to collaborate in precisely identifying personal information by facilitating the rapid and efficient exchange of DNA data among national law enforcement officers to combat terrorism as well cross-border crimes (such as illegal immigration).\textsuperscript{1385} The new ‘fast track’ data-sharing powers are very supportive for effective data sharing by removing barriers and allowing the police forces of their countries to compare and exchange

\textsuperscript{1380} A speculative search means that a check may be made against other samples and information derived from other samples contained in records or held by or on behalf of the police or held in connection with or as a result of an investigation of an offence: \textit{PACE} s 63A(1), as amended by \textit{CJPOA} s 56; see also Codes of Practice, Code D, Note 5D, effective 10 April 1995 (revised ed, 1999).


\textsuperscript{1383} Kent Police, above n 1381, [10.2].

\textsuperscript{1384} Belgium, Germany, Spain, France, Luxembourg, the Netherlands and Austria, \textit{Digital Civil Rights in Europe, Prüm’s Treaty Is Now Included Into The EU Legal Framework} (20 June 2007) EDRI-gram, Number 5.12, <http://www.edri.org/edrigram/number5.12/prum-treaty-eu>.

data more easily. The Treaty has been adopted by the EU and included in the EU legal framework.\textsuperscript{1386} Use of DNA data as an investigative tool to fight against terrorism thus opened a new horizon.

5.1.7 RISKS OR CHALLENGES ASSOCIATED WITH THE NDNAD

New technologies always bring with them ethical and societal impacts. The forensic use of DNA technology and the establishment of NDNAD is no exception. Apart from its contribution to the detection and prosecution of crime, the database has also raised some risks or challenges. After analysing the overall nature, functions, management and governance of the NDNAD as a whole, a few leading concerns or challenges with regard to the use and access of the NDNAD have been identified, which can be divided under two categories: (1) management and governance; and (2) human rights and genetic privacy issues.

5.1.7.1 Risks Regarding Management and Governance of the NDNAD

(a) Concerns about Extensive Power of Police Regarding the Use of DNA

Power Regarding Specific Investigation

Generally, through exercise of their power, the police force has gained public trust and confidence (for enforcing law and order situation), regardless of how far, or whether or not, coercive measures are actually used. It can be argued that the use of DNA evidence (and the procedures required to secure such evidence) has received broad support from the general people and society. As Kaye observes, ‘It is difficult to argue against such procedures’ especially when they are effective and ‘when there is strong support for measures that seek to prevent and solve crime’.\textsuperscript{1387} Critics, however, say that the outlay required is disproportionate to the number of cases actually solved with the assistance of DNA technology. This is a view that is expressed in the recommendations of ‘the Home Affairs Committee – Eighth Report’ on the ‘National DNA Database’. The Report noted that:

\begin{quote}
It is currently impossible to say with certainty how many crimes are detected, let alone how many result in convictions, due at least in part to the matching of crime scene DNA to a personal profile already on the database, but it appears that it may be as little as 0.3%—and we note that the reason for retaining
\end{quote}

\textsuperscript{1386} Digital Civil Rights in Europe, above n 1384.

\textsuperscript{1387} Jane Kaye, above n 1139, 20.
personal profiles on a database is so that the person can be linked to crimes he/she commits later. (Paragraph 6).  

The existing power of the police in the UK to take DNA is wider than those in any other country. Their power is unparalleled internationally in regard to (i) the taking a DNA sample without the consent of any individual who is arrested for a recordable offence but not convicted; and (ii) the fact that after such collection the DNA profile is able to be stored on the NDNAD indefinitely. 

This extensive power can be seen as threatening an individual’s privacy rights. Concerns are also raised in regards to what appears to be a bias in the sampling. Some groups, such as young males and black ethnic minorities, are disproportionately represented on the NDNAD.

**Intelligence-Led DNA Mass Screening or DNA Dragnets**

Law enforcement agencies exercise another important power with regards to the collection, analysis, and retention of DNA samples through large-scale intelligence-led mass screenings (also known as DNA Dragnets). In this process, police generally ask people to give their DNA samples as a part of case investigations. People normally volunteer their DNA samples either to eliminate themselves from the investigation (for example, the partner of a raped woman), or to help a police investigation (for example, to narrow down the list of suspects in the case of a mass screening). Once these samples are obtained they compared them with the samples collected from the crime scene in order to detect a match.

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1389 *CIPA* s 82; see also *CJA* s 10.
1390 *PACE Act* s 64(1A).
1391 This issue is discussed in detail in section 5.1.6.1 (d) of this Chapter.
1392 Zadok, Ben-Or and Fisman, above n 242, 41–6; see generally Drobnar, above n 36, 479, 486–87; see also Jennifer K Wagner, ‘Just the Facts, Ma’am: Removing the Drama from DNA Dragnets’ (2009) 11(1) *North Carolina Journal of Law and Technology* 51, 86.
1393 Harlan defines DNA Dragnets as: ‘essentially warrantless searches administered en masse to large numbers of persons whose only known connection with a given crime is that authorities suspect that a particular class of individuals may have had the opportunity to commit it’. The first DNA Dragnets was performed in the UK with Colin Patchfork Case (1987), Harlan, above n 11, 187, cited in Zadok, Ben-Or and Fisman, above n 242, 41.
1394 Kennedy, *We Should Be Outraged by These DNA Databases*, above n 815.
Very often these individuals are approached not as suspects, but rather as ‘volunteers’ whose cooperation is sought due to their physical similarity to a description provided of a perpetrator (based on information from witnesses); or sometimes on the basis that their usual place of residence or workplace near a crime scene.\footnote{Kevin Bersett, "Victims Challenge Police Use of Controversial "DNA Dragnets"", The New Standard (online) 27 September 2004 <http://newstandardnews.net/content/index.cfm/items/1044>.} In reality, these individuals have little choice — if they refuse to ‘volunteer’, greater suspicion will attach to them. If the police get search warrants, they are bound to provide a sample. For instance,

[I]n 1998 in an attempt to catch the perpetrators of 84 sexual offences and of burglary against elderly women, the Metropolitan Police initiated one of the largest voluntary DNA screenings which was aimed at black males in South London. However, individuals who did not “volunteer” to submit DNA samples were sent “threatening letters” from Scotland Yard, alleging that their actions were hampering investigations’.\footnote{Staley, above n 275, 41–2, cited in Privacy International, Mass Screenings of Volunteers Helps to Build UK DNA Database (2006) http://www.privacyinternational.org/article.shtml?cmd[347]=x-347-508147.}

Since the establishment of the NDNAD, police forces throughout the UK have increasingly started asking certain classes of individuals, including those with no criminal records) to submit their DNA samples to the police in order to assist with investigations. Statistics released in the UK Parliament in December 2005 revealed that at that time the NDNAD contained the DNA information of more than 15,116 individuals who gave their samples voluntarily to assist an investigation.\footnote{Privacy International, Mass Screenings of Volunteers Helps to Build UK DNA Database, above n 1396.} In this way, the names (and DNA) of innocent persons are included on the police databases; much to the horror of their relatives, friends, neighbours, and employers, and themselves. They find themselves not merely connected during the investigation in connection with various horrendous crimes,\footnote{Bersett, above n 1395.} but then, in the UK, their DNA sample may remain on the database indefinitely. The need to ensure ‘true voluntariness’ for those providing DNA samples is one of the concerns raised; another is the nature of consent in regard to its retention.

\textit{Risks Associated with Speculative Searching}

\footnotetext[1395]{Kevin Bersett, "Victims Challenge Police Use of Controversial "DNA Dragnets"", The New Standard (online) 27 September 2004 <http://newstandardnews.net/content/index.cfm/items/1044>.}
\footnotetext[1397]{Privacy International, Mass Screenings of Volunteers Helps to Build UK DNA Database, above n 1396.}
\footnotetext[1398]{Bersett, above n 1395.}
The use of the speculative searches method is associated with some risk. As in the DNA mass screening process, the individual who has consented to participate in a speculative search for one case are not allowed to withdraw their consent for the use of their DNA for matching purposes in later searches, and their sample are kept indefinitely for other searches unrelated to the original case. In this way someone’s human rights and right to privacy is under threat.

(b) Concerns about Informed Consent Issue

Another significant concern with regards to the use of DNA data is the ‘informed consent issue’. Generally two types of consents from donors are obtained by police in this process:

- Their sample to be used for comparison with crime scene sample;
- Their sample to be retained indefinitely and according to law consent with regard to retention of sample is non-revocable.\(^{1399}\)

**Legal Justifications for Informed Consent**

The Home Office ‘*Proposals for Revising Legislative Measures on Fingerprints, Footprints and DNA Samples (1999)*’ reflected the idea that voluntary samples should be obtained with consent\(^{1400}\) and once consent is given for retention of such sample it would be irrevocable.\(^{1401}\) The amendment of the *PACE Act* by the *CJPA* has provided the legislative basis for the indefinite retention of DNA samples collected from volunteers who has participated in a mass screening process. It is, however, subject to the condition that they had given their sample voluntarily or with free consent.\(^{1402}\) Moreover, the FSS has developed a ‘volunteer kit’ with a view to ensuring that a volunteer sample would not be loaded onto the NDNAD without the donor’s full consent.\(^{1403}\) There have been various mass requests for volunteer DNA samples in regard to a number of serious crimes in the UK before and after

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\(^{1399}\) Williams, Johnson and Martin, ‘Genetic Information and Crime Investigation’, above n 1139, 94.


\(^{1401}\) Williams, Johnson and Martin, ‘Genetic Information and Crime Investigation’, above n 1139, 94. See also *CJA* s 82.

\(^{1402}\) *PACE Act* s 64(3AC), as amended by *CJPA* s 82.

introduction of volunteer kit. However it is unclear how effective the use of the volunteer kit is in ensuring fully informed consent.

Refusal to Supply Sample Raises Suspicion

It rarely happens that people refuse to supply their DNA sample, because such a refusal immediately raises suspicions regarding that person. It is, therefore, dubious whether people can truly and freely give their consent in these circumstances when refusal to give a sample immediately places a person under suspicion. In this regard, Barbara Prainsack argued that:

> Even if a person states that s/he is providing a DNA sample voluntarily, an element or suggestion of coercion can be present, for example when the volunteer knows that s/he would be treated as a suspect if s/he did not volunteer DNA …

Controversy about Whether Volunteers Sufficiently Informed

There are also some doubts about whether volunteers are provided with sufficient information about what they are agreeing to (that is, consent for comparison, and consent for indefinite retention with no right to withdraw their consent). Volunteers consent to give their sample in order to assist police in an investigation and exonerate themselves, but without realising that the DNA profile created from their DNA sample will be kept on the NDNAD indefinitely.

Consent with Regards to Retention is Non-Revocable

In the UK, according to the legal requirement, separate consent forms (for consent to submit a sample, and consent to retention on the NDNAD) are used. The consent with regard to retention made the situation more difficult for volunteers or ‘donors’,

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1404 Ibid.
1405 Ibid.
1408 Human Genetics Commission, 'Whose Hands On Your Genes?', above n 1406, 45[10.15].
1409 Privacy International, Mass Screenings of Volunteers Helps to Build UK DNA Database, above n 1396.
as such consent is non-revocable. Consequently, sample providers can not apply for destruction. This approach differs from practices in Scotland and many European countries, where consent can later be withdrawn. It is also contrary to many standard practices in medical research.

Giving Consent under Conditions of Pressure

Sometime police use undue coercion or force to induce people to provide their samples ostensibly ‘with consent’. There is a lack of clarity as to whether the consent obtained by the police from volunteers can always be regarded as genuine or free consent, as it is often given under distress, pressurised condition or sometimes in the absence of appropriate advice. A refusal to participate in the police investigation process also raises suspicion against them and makes the concept of the free consent quite hollow in such circumstances. A reasonable person can assume that an individual has little choice but to consent to the police request for his or her DNA sample, for although such giving is claimed as ‘voluntary’, actually they are giving their consent under pressure.

(c) Concerns Regarding Retention of DNA Samples and Profiles

Insertion and retention of DNA data on the NDNAD has become another sensitive issue. Section 82 of the CJPA allows samples to be retained indefinitely, even where an individual is acquitted or the prosecution not proceeded with. Such indefinite retention of the DNA data of innocent people could associate the stigma of criminality with them, even if their inclusion on the database only signifies that they have provided such data or sample voluntarily or in a mass screening. Because of the lack of universality of DNA sampling, a stigma of criminality could attach to the mere fact that an individual’s DNA sample and/or profile is on the NDNAD. The extent of this database is undeniably seen as broadly intended to represent the actual or likely criminal community. Therefore, it is not irrational to raise an objection

1411 Recently this has happened in the case of R (On the Application of GC and C [2011] UKSC 21(18 May 2011).
1412 Staley, above n 275, 41.
1413 The American Civil Liberties Union (ACLU) quoted in Bersett, above n 1395.
1414 PACE Act ss 64 (1A) and (1B), as amended by CJPA s 82 (1A).
regarding the retention of DNA samples and profiles of innocent people on this database. Since they have never committed a criminal act in their whole life, and little likelihood of such commission in future\textsuperscript{1415} (or, rather, no more likelihood than any others whose material is not on the NDNAD), their inclusion can be seen as discriminatory.

The Nuffield Council Working Group has expressed its concerns on this issue as thus:

\[T\]he Database has proved to be an excellent tool in the crime-solving process. However, the need for a debate of the ethical issues raised by police powers to take, store and analyse the DNA of suspects, witnesses and victims remains.\textsuperscript{1416}

Retention of DNA samples and/or profiles from unconvicted or innocent persons has been greatly criticised. Currently a large number of people (about one million as at May 2009) are represented in the NDNAD who are the unconvicted or innocent people.\textsuperscript{1417} The Information Commissioner for Scotland points out that:

\[T\]he indefinite retention of DNA profiles of individuals who are arrested but are not convicted of any offense is an intrusion into their private lives.\textsuperscript{1418}

In the ‘Consultation Response’, the ‘Wellcome Trust’ also expressed its concern over the question of which individuals are included on the NDNAD, and in regard to the extent to which emerging capacities (though still as yet extremely limited in reliability) to infer phenotypical information (that is, appearance) from DNA data should be incorporated into the scope of the NDNAD.\textsuperscript{1419} Both it described as ‘highly contentious’ issues. The potential for such inferences is currently extremely limited, but is being explored in research (for example, in relation to eye colour, skin pigmentation and even face shape).\textsuperscript{1420} Again, this has implications for privacy rights.

\textsuperscript{1416} Hepple, above n 1377.
\textsuperscript{1418} Krimsky and Simoncelli, above n 253, 172–73.
\textsuperscript{1419} The Wellcome Trust, ‘The Forensic Use of DNA and the National DNA Database’ (2008) [4].
(d) Representativeness and Discrimination

In the forensic contexts, there are some concerns about racial or ethnic bias in that bias that is already evident may be reproduced in the use of DNA matching capacity and even be further intensified by it. Already while investigating a case (without recourse to DNA analysis), investigators may only look for people of a particular racial background or ethnicity (that is, racial profiling). As a result, investigators may sometimes incorrectly include a person who falls under a particular description and in the same way exclude a suspect who does not match that background. Racial profiling reinforces racial stereotyping and does not acknowledge the reality of differences within communities and similarities across diverse communities. An identified racial group may form a minority in the community, and, reflecting existing preconceptions, investigations that use racial profiling could disproportionately focus on such communities. Moreover, racial profiling should not be an acceptable as a tool for police investigation because its use is often ‘an unjustified expression of racism’.

The 2007 Report on ethical issues associated with the forensic use of DNA that was issued by the Nuffield Council on Bioethics revealed that black ethnic minorities are disproportionately over-represented on the NDNAD and noted that this is a matter of considerable concern. Questions are inevitably raised as to the reasons for such unequal representation, such as variations in access to legal representation, detection

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1421 Michael Boylan, 'Racial Profiling and Genetic Privacy: Defining the Parameters in Criminal Cases' (Center for American Progress, July 2008) 3.
1423 Dale defined Racial Profiling as:
[T]he practice of targeting individuals for police or security interdiction, detention, or other disparate treatment based preliminary on their race or ethnicity, in the belief that certain minority groups are more likely to engage in unlawful behaviour.
1426 Boylan, ‘Racial Profiling and Genetic Privacy’ above n 1421, 11.
rates and types of crime represented. Undermining the ‘principle of the presumption of innocence’, such representation inevitably appears to incriminate individuals ‘by association’. This also ‘raises concern of an institutionalized ethnic bias in the criminal justice system’. In terms of policing, the use of racial profiling can skew results by targeting particular visibly identifiable groups, further fuelling not only stereotypical perceptions but supplying highly suspect evidence for their perpetuation. For instance, if one targets a particular ethnic minority for DUI testing or searches for drug possession and so forth on the basis of racial profiling, then any result will necessarily serve to contribute to a higher conviction rate for that group. The failure to test members of other groups will, conversely, lower their representation in overall results. Hence, profiling with its distorting ‘impacts on surveillance, search, investigation, arrest and incarceration for the racialized communities [that have been] singled out for its destructive attentions’ can produce a self-perpetuating picture and pattern of offender behaviours.

Some have questioned the extent to which the NDNAD complies with the first principle of the Data Protection Act, that is, that personal data must be processed fairly. In addition, the popularity of racial analysis tests for genealogical purposes has already raised concerns that it will reinforce racial stereotypes or bias by emphasising the differences between populations of different backgrounds. Even assuming the utility of racial categorisation in interpreting DNA results, it could be argued that overtly racialising biological evidence in the criminal justice system embarks upon a dangerous path that biologises and pathologises crime along racial grounds. In this regard, Erin Murphy argued that:

[T]his widespread acceptance of racial and ethnic categorisation as a means of quantifying DNA results (say, allelic frequencies) opens the door to a kind of twenty-first century racial eugenics ...

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1428 Bahdi, Parsons and Sandborn, above n 1423, 34.
1429 Ibid 31–2.
1433 Murphy, above n 818, 321.
The NDNAD itself notes that research is underway ‘[u]sing anonymous data on ethnic appearance (as perceived by the police)’ regarding the development of an ‘ethnic inference database for predicting the likelihood of an undetected offender having one ethnic appearance as opposed to another’.1434 However, research on ‘ethnic-inferencing’ remains highly controversial.1435

(e) Lack of Transparency and Checks and Balances

The 2002 Report of the Human Genetics Commission (HGC) highlights public concerns about the collection of DNA samples for trivial offences, the duration of their retention in the database, and also in regard to research related to forensic DNA as well as use of genetic information to predict characteristics of a person (which may in the future extend to behavioural traits).1436 In this regard, the HGC also noted that ‘some people and organisations have expressed concerns about certain aspects of the present arrangements’ regarding the forensic use of DNA information and that this ‘could affect public confidence’ about the NDNAD.1437 In other words HGC expressed concerns that the present arrangement of the NDNAD has some impacts on privacy. A consistent concern has been expressed by the HGC in relation to public discussions about the NDNAD that apparently there had been ‘no discernible systematic attempt … to evaluate the utility of this database’ on the basis of public consultation.1438 A 2009 report by Bob Hepple indicated that in the then 14 years of its existence, there had been a lack of public debate, transparency as well as checks and balance regarding the governance and use of the NDNAD. There was also lack of data about public attitudes towards the issues related to the use of NDNAD which

1435 Hepple, above n 1377.
1437 Ibid.
have been highlighted by the 2005 House of Commons Select Committee on Science and Technology.¹⁴³⁹

Therefore, there have been calls for a full public debate on the collection and use of bio-information by the police, particularly on the uses of the NDNAD.¹⁴⁴⁰ Moreover, the Runnymede Trust in their 2009 report recommended that the government should take measures to ‘correct this state of affairs with a wide-ranging consultation’.¹⁴⁴¹

Finally, the HGC called for a review of the database and new laws to be passed to govern the use of DNA database.¹⁴⁴² The UK’s ‘genetics watchdog’ argued that:

Britain has built the world’s biggest DNA database without proper political debate and police routinely arrest people just to get their DNA profiles onto the system.¹⁴⁴³

All these reports and data indicates a lack of proper checks and balances in the NDNAD and this is one of the biggest challenges for proper functioning of a DNA Database like NDNAD. Therefore, it is important that the government take some initiatives to fill this lacuna.

(f) Risks Associated with Familial Searching

‘Familial searching’ seems to be very useful; however, it clearly represents a major intrusion into family life, in other words into ‘family privacy’. It could reveal, for example, that there is no genetic relation between the parties who have long believed such relationship existed, which might also affect family relationships.¹⁴⁴⁴ Both the individuals involved and their relatives’ may face some social stigma. Again, the practice of familial searching has some negative impacts, such as, samples or profiles of innocent persons (those who have no criminal records) are retained in the database.

¹⁴⁴⁰ Hepple, above n 1377.
¹⁴⁴² Peter Griffiths, ‘Police Arresting People "Just for the DNA"’, Reuters (online) 24 November 2009 <http://www.reuters.com/article/idUSTRE5AN1FA20091124>.
¹⁴⁴³ Ibid.
¹⁴⁴⁴ Levitt, above n 402, 239.
and their samples could be subsequently used as a part of an investigative process. Very often the outcome of such investigations leads to a potential relative of the person who has left biological material at a crime scene. In this way, a large number of innocent people may unwittingly become suspects.1445

(g) Risk with Inclusion of Child Offenders in the NDNAD

Under the UK legal system a child aged between 10 to 14 years was presumed to be 'doli incapax' (that is, they are lack of sufficient maturity to be guilty of a crime) until 1998. However, the Crime and Disorder Act 1998 removed that presumption.1446 Under the current provision of this Act, any child aged 10 or over1447 in the UK can be arrested on suspicion of a criminal offence.1448 It has been a common understanding for many years that early exposure to the criminal justice system is harmful and counter-productive for children. It is for this reason the system of reprimands and final warnings was developed with the idea behind that children would only be taken to court for the most serious offences or where opportunities to change their behaviour had failed. However, the abolition of the presumption of 'doli incapax' has allowed even relatively young children to be held criminally responsible for minor offences (such as misjudgements for testing boundaries, for behaviour that would once have been described as 'being naughty').

Moreover, Sue Penna and Stuart Kirby noted that s 10(2) of the CJA 2003 provides:

[Extensive police powers in England and Wales to routinely obtain DNA samples without consent from anyone aged ten or above in police detention who has been arrested in connection with any recordable offence, regardless of whether the person is subsequently charged with an offence.1449

Retention of the DNA samples and profiles of children and young teenagers is therefore an added additional concern. The NDNAD policy in this matter is unique. ‘No other country in Europe criminalises children at such a young age; and [also] no

other country in the world has such an extensive DNA database'. The Nuffield Council on Bioethics argued that:

> [t]he policy of permanently retaining the bioinformation of minors is particularly sensitive in the [UK], where the age of criminal responsibility is low (at age ten years in England and Wales and eight in Scotland) compared with many other countries. It may be argued that retaining bioinformation from young people is contrary to Article 40 of the UN Convention on the Rights of the Child, in that the Convention requires special attention to be given to the treatment of children by legal systems, to protect them from stigma, and that if they have offended, opportunities for rehabilitation should be maximised. The destruction of relevant criminal justice records and accompanying body samples could become one element in such a rehabilitative process.

In response to the Marper case, on 16 December 2008, the Home Secretary, Jacqui Smith, set out the government response in the following words, ‘the DNA of children under 10 — the age of criminal responsibility — should no longer be held on the database’. She also added, such data ‘held on the database has already been removed and will not be retained in future either’. Following the Home Secretary’s announcement, the profiles from all the children under 10 years were removed and deleted from the NDNAD. Nevertheless, ‘currently more than 3 000 children aged 10–17 have profiles on NDNAD, and around a quarter of the 5 million DNA profiles were added when the person was under 18’. The CJPA and the CJA have made possible to obtain DNA samples from juvenile offenders upon arrest and retain them indefinitely. It is always possible that children can reinvent themselves upon reaching adulthood, leaving their mistakes behind; but with regards to the current practice of retaining children’s DNA, Dowty and Wallace draw attention to a situation:

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1450 Lawrence Öqvist, above n 449, 139.
1454 UK Home Office, ‘Keeping the Right People on the DNA Database’, above n 12, 6.
1457 Willis and Willmott, above n 1232, [1.2].

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[W]hereby the imposition of targets on police forces “has created a climate in which children are now highly vulnerable to arrest for trivial misdemeanours” and together with “the current policy of retaining children’s DNA on arrest” increases the risk that they are locked into the criminal justice system for the rest of their lives.\textsuperscript{1458}

But the incoming coalition government has promised to change the system by copying the Scottish model for DNA retention.\textsuperscript{1459} Considering the special nature of children’s DNA data and relevant implications, it is to be desired that the government will soon take appropriate measures to protect the interest of child or youth offenders and suspects.

5.1.7.2 Human Rights and Privacy Violations

Along with these challenges, another concern with the use of NDNAD is the potential for ‘human rights and privacy violations’. Because DNA data has the potential to reveal a great deal of personal information and it can be used to violate genetic privacy. Theoretically, a physical description of the source (or sample provider) of crime scene sample could be determined through a further and more multifaceted examination of such DNA SOC samples.\textsuperscript{1460} The analysis of a DNA sample to determine the physical traits of the source is an option currently limited by the available technology. However, as more reliable analysis methods emerge, this approach would provide descriptive information to identify suspects.\textsuperscript{1461} The National Society for the Prevention of Cruelty to Children (NSPCC) has articulated their agonies about the collection of DNA data as it constitutes a physical intrusion into a person’s privacy and can be extremely sensitive.\textsuperscript{1462} Moreover collection of someone’s DNA sample without their informed consent is significant privacy issue.

In addition, DNA tests based on racial background (that is, racial profiling\textsuperscript{1463}) are provoking greater controversies.\textsuperscript{1464} Moreover, extensive power and practice of UK

\textsuperscript{1459} Whiteley, above n 1456.
\textsuperscript{1460} Bellamy-Royds and Norris, above n 1372, 15.
\textsuperscript{1461} Ibid 18.
\textsuperscript{1463} See generally Boylan, ‘Racial Profiling and Genetic Privacy’ above n 1421, 3–6, 11.
police regarding the use of NDNAD raises legitimate fears about individual privacy and autonomy in the face of state power. The recent ruling of Marper case has also referred to this eventuality. This important aspect of the growth of the NDNAD and forensic DNA sampling demands greater attention.

(a) Debate between Individuals’ Right to Privacy and Public Interest: Analysis of the Marper Case (2008)

In the Marper case, ’the legality of the retention of DNA samples and profiles from those individuals who are not subsequently charged or convicted of any criminal offence after their arrest’ was reviewed by the UK House of Lords. The 2001 amendment to the PACE Act had removed the obligation to destroy the DNA sample or profile even though there is no subsequent prosecution, or where there is an acquittal of any person arrested on suspicion. It opened the door for indefinite retention of DNA data. This amendment was subject to legal challenge in Marper. The House of Lords considered that the retention of DNA from individuals who had not been convicted of a crime was not a breach of their right and not discriminatory and their right to privacy. Such violation is seen as being proportionate, as the ‘samples could only be used for the purpose of “prevention or detection of crime, the investigation of an offence or the conduct of a prosecution”’ under s 64(1A) of the PACE Act (as amended by s 82 of the CJPA). The said provision, therefore, did not contravene Articles 8 and 14 of the ECHR. Supporting this proposition, Lord Woolf CJ stated that though it was an interference with the privacy rights under Article 8, this was justified because of the statutory provisions which aimed to promote the public interest. According to Lord Woolf CJ:

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1464 See generally Ossorio, above n 1424. See also Boylan, ‘Racial Profiling and Genetic Privacy’ above n 1421.
1465 Williams and Johnson, ‘Wonderment and Dread’, above n 1113, 214.
1467 Hepple, above n 1377.
1469 S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [24].
1470 Ibid; Jane Kaye, above n 1139, 20.
I draw attention to the statutory provisions to which I have referred because they make clear that we are dealing with a situation where Parliament has drawn up a code carefully designed to prescribe that circumstances in which the steps referred to can and cannot be taken.1471

However, on 4 December 2008 the ECtHR ruled that there had been a violation of Article 81472 of the Convention through the indiscriminate retention of their (S and Marper) DNA samples and profiles1473 in the NDNAD. Whether the retention of cellular samples and DNA profiles may in general be regarded as justified under the ECHR was not the issue considered by the court. The only issue which is considered by the Court is whether the retention of the DNA data of the applicants, as persons who had been suspected, but not convicted, of certain criminal offences, was justified or not under Article 8(2) of the Convention. The Court observes that:

[T]he protection afforded by Article 8 of the Convention would be unacceptably weakened if the use of modern scientific techniques in the criminal-justice system were allowed at any cost and without carefully balancing the potential benefits of the extensive use of such techniques against important private-life interests.1474

In conclusion, the Court finds that:

[T]he blanket and indiscriminate nature of the powers of retention of the fingerprints, cellular samples and DNA profiles of persons suspected but not convicted of offences, as applied in the case of the present applicants, fails to strike a fair balance between the competing public and private interests and that the respondent State has overstepped any acceptable margin of appreciation in this regard. Accordingly, the retention at issue constitutes a disproportionate interference with the applicants’ right to respect for private life and cannot be regarded as necessary in a democratic society.1475

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1472 Liberty, a human rights organisation, has defined the concept of a ‘right to a private life’ and it: encompasses the importance of personal dignity and autonomy and the interaction a person has with others, both in private or in public. Respect for one’s private life includes: respect for private and confidential information, particularly the storing and sharing of such information; the right not to be subject to unlawful state surveillance; respect for privacy when one has a reasonable expectation of privacy; and the right to control the dissemination of information about one’s private life. See Liberty—Protecting Civil Liberties Promoting Human Rights, Article 8 Right to A Private and Family Life (30 October 2011) <http://www.liberty-human-rights.org.uk/human-rights/human-rights/the-human-rights-act/what-the-rights-mean/article-8-right-to-a-private-and-family-life.php>.
1473 S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [112].
1474 Ibid.
1475 Ibid [125].
The judgment in *S and Marper*\(^{1476}\) held that the practice of retaining of the DNA samples and profiles on the NDNAD of those arrested — but where guilt was not subsequently established or admitted — should be discontinued. Moreover, presently retained DNA profiles should be removed from the DNA database as well as all samples should be destroyed. In what has been described as a ‘landmark decision’, the Court set ‘limits to the growth of national DNA databases’.\(^{1477}\) This judgment also ‘sends out a clear message to other countries’ — there should be a limit to retaining intimate body samples and DNA profiles in forensic databases.\(^{1478}\)

Again, in the case of *R (on the application of GC) (FC) (appellant) v the Commissioner of Police of the Metropolis (Respondent)* and *R (on the application of C) (FC) (Appellant) v the Commissioner of Police of the Metropolis (Respondent)*, By a majority of 5 to 2, the Supreme Court held that:

S 64(1A) could be interpreted compatibly with Article 8 and that, accordingly, no declaration of incompatibility should be made. However, because this matter was already being considered by Parliament and because it involved sensitive and difficult questions, it would not be appropriate for the Court to make decisions about the facts of the individual cases or to make a specific order requiring ACPO to reconsider the guidelines. The Matter should be left to Parliament to resolve.\(^{1479}\)

This judgment again reflected that individual privacy had been violated and would continue to be violated until the UK Parliament actually enacted some protective legislation. In addition, some recent government activities represented reluctant response by the UK to the ECtHR ruling in 2008. For instance, at the end of 2008, the number of profiles being included on the NDNAD was rising at the rate of 6 000 per week. The UK is believed to hold the DNA of at least 4 million people (more than 5 million profiles) on its database. There have also been individual cases about illegally retained DNA samples.\(^{1480}\) In addition more than 90 000 innocent people’s DNA has been added to the NDNAD as it keeps indefinitely the profiles of

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\(^{1476}\) Ibid.


\(^{1478}\) Ibid.

\(^{1479}\) Matrix, *Case Comment*, above n 1313.

unconvicted suspects. According to the Liberal Democrats Research (based on Parliamentary answers) a further 4 33 752 profiles were added to the DNA database in the less than 12 month period after the human rights court decision on December 2008.\(^{1481}\)

The above discussion articulates and argues that there are some instances of human rights and privacy violations exist in the UK. The main objection raised by the *Marper case* is the ‘blanket and indiscriminate’ retention of DNA information. The mere retention of personal data have direct impact on the private-life of an individual concerned, irrespective of whether subsequent use is made of the data or not. Furthermore, the retention of the unconvicted persons’ data may be especially harmful in the case of minors (the first applicant of the *Marper Case*), given their special situation\(^{1482}\) and the importance of their development and integration in society.\(^{1483}\) These are some relevant concerns that could be raised in similar kinds of situation. After analysing the *Marper case*, it can be alleged that state security measures (such as, the use of NDNAD in the justice delivery system of UK) cannot be compromised as it is necessary to maintain law and order as well as to protect public safety. Similarly, curtailing or restricting individual freedoms does not make it easier to keep the peace. Therefore, crucial ethical and legal issues relating to human rights, privacy, informed consent and discrimination raised by the use of NDNAD cannot be ignored.

According to William Copper, ‘the moral “dividing line” is between integrity and cynicism’.\(^{1484}\) In order to balance the two competing forces, it can be recommended that rather than establish a population-wide database, strict criteria for retention need to be maintained (limiting the retention period, types of sample, and setting conditions of access for set personnel). Further adequate safeguards for all sample providers (including convicted, unconvicted individuals and/or innocent people) should be used to improve public confidence. The argument is about whose DNA


\(^{1482}\) Child’s or minor’s interest is specially protected under the *CRC* art 40.

\(^{1483}\) Vermeulen, above n 370.

profiles should or should not be on the database and also whether after a certain time convicted criminals should also have the right to have their profiles removed. It is a general rule that it is the right of a person who has been arrested but not convicted for a minor offence not to share his or her DNA with the state. In this way, a perfect balance will be kept between human rights and public safety or national interest. In this regard the current UK government plan for adopting Scottish System enacting the Protection of Freedoms Bill 2011 is one of the recent initiatives in response to the ECHR ruling in 2008 that is worthy of appreciation. However, uncertainties will loom until such rules are implemented and used in practice.

5.1.8 CONCLUSION

The application of genetic technologies to forensic science has been of great benefit in solving crime and in the elimination of suspects. Thus, forensic identification technologies (with the use of DNA data) are supporting and encouraging a pathway of reform in the justice delivery system around the world. The NDNAD is no exception, and plays a vital role in this reform process of the UK legal system.

This chapter has analysed the case of the NDNAD (that is, some factors for the establishment and better functioning of the NDNAD). Such discussion particularly included legislative developments, governance as well as management of the database, its well equipped mechanisms and modern technology with regard to DNA sample collection, analysis, and retention of DNA samples and profiles, and diverse sample sources for the purpose of criminal case investigations. The discussion and analysis of this case study has revealed that the UK has developed a good database compared to other countries that have almost the same political, economic, social and cultural background. There are also significance differences between the UK and other countries regarding the practices and criteria of entering the DNA profiles in the database as well as in regard to their removal.

However, this case study also reveals that the growth of the NDNAD and its extensive use clearly has some adverse effects in terms of human rights and privacy.

1486 House of Lords Select Committee on Science and Technology, above n 1128, [4.29].
There is both excitement about the potential of NDNAD and fear regarding its use. Each and every step of the expansion process of the NDNAD as well as its uses has created some concerns about the human rights and privacy violations (the *Marper case*; the SC judgment in the *case of GC and C*). The other findings from this case study signify that there is controversy regarding the extensive legislative provisions which have enabled the expansion of the database through sampling the DNA from various sources (including innocent people, child offenders and so on) and its indefinite retention policy as well as practice. The increased uses of DNA sampling and resulting profiles by the police have raised some other ethical concerns (for instance, how informed is the consent in sample collection) and such practices have some definite human rights and privacy impacts.

In regard to the concerns which have been raised by the controversial provisions of the UK legislation (and their permitted practices), the author of this thesis hopes that some policy limitations would be able to mitigate some of those concerns and practices.

The next chapter (that is, Chapter 6) will examine the second case study, that on the National Forensic DNA Profiling Laboratory (NFDPL) of Bangladesh. This case study will also concentrate in the same areas as the study on the UK’s NDNAD, and will include legislative developments, governance and management of the laboratory, technological development and capabilities with regard to DNA sample collection, analysis and retention of DNA samples and profiles, diversity in sample sources for the purpose of criminal case investigations (that have been highlighted and argued in the first case study conducted on the NDNAD). Chapter 6 will also analyse how the same type of DNA database or laboratory function in the different political, economic, social and cultural background, and how much these factors contribute to the proper management of a DNA laboratory.

Subsequently, the chapter will explore the issues with regards to human rights and privacy challenges in the context of the forensic use of DNA or genetic information, and, while using such information in criminal or civil case investigations, how these issues could be balanced with public interest or state security measures of
Bangladesh. The data that have been collected while conducting the case study on the NFDPL (Bangladesh) will illustrate existing scenarios and challenges faced by this laboratory. Then further discussions will identify gaps between developed and developing countries regarding DNA data analysis and their forensic use; that is to say, comparative analysis between the findings from the NDNAD and the NFDPL will be conducted and researcher will see how those gaps could be minimised.
CHAPTER 6

6.1 NATIONAL FORENSIC DNA PROFILING LABORATORY (NFDPL) OF BANGLADESH: A CASE STUDY OF DEVELOPING COUNTRY

6.1.1 INTRODUCTION

It has already been identified that revolution in DNA technology has a number of impacts for the world community, whether that economy is in a developed or developing country. However, the nature of the challenges facing the developed countries is somewhat different from that of those facing the developing countries. For instance, in reality most forensic DNA services or databases are located in the industrialised world and it is these countries that mostly benefit from these facilities. The situation of the developing countries is far different. Most understandably lag behind as they do not have access to sufficient funds, nor possess the technological capacity and human resources for establishing forensic DNA services or databases for assisting in their justice delivery system. Moreover, the ‘right to privacy’—including the ‘concept of genetic privacy’—and the overall human rights situation are very different in developed and developing countries. For instance, the UK and Bangladeshi legal-political and socio-economic systems are derived from two completely different backgrounds. Therefore, the situation regarding human rights generally as well as the right to privacy is different in these countries.

After analysing the forensic DNA context of a developed country (that is, the UK NDNAD) in the previous chapter, it is appropriate to examine the implications of these advances in a developing country. The specific intention of this chapter is to determine and evaluate the challenges faced by the developing nations, as well as scrutinise how well-designed mechanisms could control misuse (in terms of human rights and privacy violations) of this kind of knowledge. The main focus of this chapter is, therefore, to examine the current situation of the forensic use of DNA information in the justice delivery system of Bangladesh.

The National Forensic DNA Profiling Laboratory (hereinafter referred to as the NFDPL) is the sole forensic DNA laboratory in Bangladesh and assists both the civil
and criminal case investigation processes of Bangladesh. The NFDPL of Bangladesh has been chosen for conducting case study to representing the scenario of a developing country. Some international benchmarks or organisations have determined that Bangladesh is a low income economy\textsuperscript{1487}, or a least developed country (LDC),\textsuperscript{1488} while others identify it as the developing country.\textsuperscript{1489} It is worth to mention here that with regards to the issue of using DNA technology, the challenges and risks for developing and least developed countries (LDCs) are almost identical. Although in terms of its economy, Bangladesh represents a low-income economy or LDCs; nevertheless for the purpose of present thesis, the situation of Bangladesh is examined as representative of the context of a developing country. The author believes that the issues identified by this case study are the same and that the research outcomes would be useful for other countries with similar problem, regardless of whether they are developing or LDCs.

This case study is dedicated to answering the two main research areas of this study: (i) whether there is any scope for the violation of human rights and privacy while using forensic DNA laboratory in Bangladeshi justice delivery system; and (ii) an evaluation of the gaps between developed-developing countries with regards to such use of DNA data. The discussion is divided into a number of sections and subsections. First, section 6.1.2 draws a general picture of the use of traditional forensic investigation mechanisms in Bangladesh. Then the discussion points to the justification for this case study. Sub-section 6.1.3. highlights the socio-political and human rights situation of the Bangladeshi people. Subsequently, section 6.1.4 presents the case study of the NFDPL focusing on its background, nature and composition, objectives, oversight, operation and management. Its existing practices (that is, the process of DNA sample collection, analysis, storage and retention) as well as uses are examined. It is worth mentioning that section 6.1.4.3 has examined

\textsuperscript{1487} Economies are divided according to 2010 Gross National Income (GNI) per capita, calculated using the World Bank Atlas Method. The groups are: low income – USD 1005 or less; lower middle income – USD 1006–USD 3975; upper middle income, USD 3976–USD12,275; and high income – USD 12,276 or more': World Bank, \textit{How We Classify Countries—Country and Lending Groups}, above n 397.


and critically analysed the *Deoxyribonucleic Acid (DNA) Act 2010 (draft)* of Bangladesh (‘draft DNA Act’).\(^{1490}\) Furthermore, section 6.1.5 identifies the basic risks or challenges associated with the NFDPL through an analysis of both qualitative (semi-structured interviews) and quantitative (survey) data. This section examines and analyses the NFDPL services, particularly looking at ‘human rights and privacy violations’ and the ‘financial-technological-administrative challenges’ the NFDPL faces. Finally, this chapter provides a brief summary of those challenges.

6.1.2 A CASE STUDY OF BANGLADESHI DNA LABORATORY: A DEVELOPING COUNTRY CONTEXT

Very recently the practice of collection and use of genetic information to solve criminal cases has begun in Bangladesh. Previously, the case investigation system, production of evidence and judicial trials were conducted and managed in Bangladesh relying on and applying mostly the traditional forensic investigation mechanisms\(^{1491}\) (such as using fingerprints, documentary as well as oral evidence, expert opinion, and evidence based on other items found at a crime scene). However, the traditional investigation system contains some problems, such as fingerprinting, oral and documentary evidence which are not error-free. Evidence can also be forged. In addition, very often law enforcement agencies discover some remnants of a human body or discomposed human bodies either with skull, some teeth, some ribs and bare bones, clothing which are stained with blood, saliva, semen, hair, at the crime scene. Mostly with these items it is hard to detect accurately whether the skeleton was of a human being or not; and, if it is a human being, who that person

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\(^{1491}\) Forensic investigation helps to detect factual evidences and there are many subdivisions of forensic investigations. Investigators specialising in ‘entomology’ conduct investigative examinations of insects in any legal proceedings. But today, the term most closely associated with the investigation of untimely human death. ‘Forensic Odontology’ mainly involves the identification of human remains by use of dental records. Other subdivisions include ‘forensic pathology’, ‘forensic psychiatry’, ‘forensic radiology’, ‘forensic anthropology’, ‘forensic geology’, and ‘forensic toxicology’. Investigators in all of these divisions carry out exact techniques to collect sufficient data that will be used to prove or disprove accusations of criminals. For further details see, Michael Fitting Karagiozis and Richard Sgallo, *Forensic Investigation Handbook: An Introduction to the Collection, Preservation, Analysis, and Presentation of Evidence* (Charles C Thomas Publisher, 2005) 7–13; see also WiseGeek, *What is a Forensic Investigation?* (5 November 2011) <http://www.wisegeek.com/what-is-a-forensic-investigation.htm>.
Moreover, paternity disputes, proof of relationship, rape and murder cases are also some other issues which usually arise before the investigation department. In Bangladesh, cases remain unresolved year after year due to the lack of proper and effective investigation methods. The application of DNA testing for the case investigation process has opened a new opportunity for identifying criminals in Bangladesh.

The NFDPL has been chosen for this case study for a number of reasons:

First, the NFDPL is the only DNA profiling laboratory established in Bangladesh (established in 2006). No research has yet been done regarding the effectiveness of, and challenges to, this laboratory and its operations — that is to say, the issues with regard to violation human rights and privacy, as well as any gap between the NFDPL and other countries DNA laboratories or databases are yet to be examined.

Secondly, an examination of this laboratory is important to determine the existing scenario of the practice of developing countries regarding DNA data production, its use, and how a developing country with limited resources, technological capacity and technical personnel like Bangladesh use this mechanism in its justice delivery system.

Thirdly, the NFDPL has proved to be very useful until now; however, there is no legal basis (that is, no legislation or policy) to control and manage the proper use of such advanced technology and sensitive DNA data. A legal basis is necessary because, without any legal justification, all laboratory activities, case investigation process, and judicial trials are subject to legal challenges. Further, use of the NFDPL in the investigation process is an ongoing process; all existing and future activities related to this laboratory require legal validation.

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Finally, it would be useful to compare the use of the NFDPL with the NDNAD of the UK to determine the differences between these DNA service systems in their dealings with sensitive DNA data. A comparison with the DNA profiling system or forensic use of DNA data from both developed and developing countries will usefully illuminate how this issue could be more effectively dealt with by the government and the parties concerned. Moreover, the scenarios of the UK and Bangladesh will offer a snapshot of the problems and concerns which are currently encountered by the world community.

The research and investigation into the use of the NFDPL in the justice system of Bangladesh and its related effects is highly significant at this stage. The case study of the NFDPL in Bangladesh has been selected due to the factors above.

Before examining the practice of the NFDPL and the scope of human rights and privacy violations in this practice, it is essential to discuss the legal and political background of Bangladesh. It is also important to analyse the overall human rights situation in Bangladesh which reflects the legal-political and socio-economic systems of the country. The basic human rights situation has also influenced the whole process of justice delivery system, from investigative tools to ensuring justice. Therefore, the next section will examine the socio-political context of Bangladesh and its current human rights situation.

6.1.3 SOCIO-POLITICAL AND HUMAN RIGHTS SITUATIONS IN BANGLADESH

The People’s Republic of Bangladesh is a geographically small but densely populated South Asian nation. The country lies in the north-east corner of Indian subcontinent and has an area of 56 977 square miles or 1 47 570 km and a population of 124.35 million in 2001 which some 10 years later had climbed to

1495 Ibid xix.
1496 BSS, 2008 Statistical Yearbook of Bangladesh, above n 1494.
142.32 million (at 15 March 2011). The capital is Dhaka and the country is divided into six divisions and 64 districts.

6.1.3.1 Political and Legal History

Bangladesh has a long political and legal history. From ancient times, the territory has been known as ‘Bengal’ and most of its people are popularly known as ‘Bengalis’. From 1757, the British — in various forms — ruled the country for 200 years. Firstly, the British East India Company (a private, that is to say commercial entity) became established as a substantial trader in the region in the 17th century, accumulating ever greater power until it essentially ‘ruled’ this region and parts of what is now India from 1757 to 1857 AD. More formal British rule followed after the rebellion by the Indian army against the British authorities in 1857. The transfer of power to the population began with the Government of India Act in 1935.

The Government of India Act 1935 operated as a pre-independence Constitution. It recognised Bangladesh as a part of the ‘Province of Bengal’. Like many other areas, the Province was affected by the British government’s attempt in 1947 to divide the subcontinent into two separate states — Indian and Pakistan — under the Indian Independence Act 1947. The partition was hurriedly undertaken using...
largely out-dated maps and the most recent census materials by a Commission headed by a British lawyer (Cyril Radcliffe) with ‘little knowledge’ of the region’s history and a little over a month to complete this monumental task.\textsuperscript{1504} That partition caused the Province of Bengal\textsuperscript{1505} to be divided into two new Provinces — East Bengal (that is, present Bangladesh) (which, as East Pakistan, became part of Pakistan)\textsuperscript{1506} and West Bengal (which remained in India).\textsuperscript{1507} While both are predominantly Muslim areas, the simple division (with the capital situated in West Pakistan) failed to recognise the distinctly historical, social, linguistic and cultural differences. After Partition, the then wealthier and more powerful but less populous West Pakistan (now Pakistan) politically, economically\textsuperscript{1508} and culturally suppressed and began a policy that amounted neo-colonialism in relation to the East Pakistanis\textsuperscript{1509} (that is, people of Bangladesh) from 1948 to 1971.\textsuperscript{1510} The continued economic exploitation (and resulting hardships) together with the existing cultural disparity led the Bengalis to resist Pakistani dominion.\textsuperscript{1511} As a result, Bangladesh became an independent and sovereign state on the 16 December 1971 after a war of liberation that left over a million dead.\textsuperscript{1512} The historic war for national independence fought against a (West) Pakistan military dictatorship fulfilled the legitimate ‘right to self determination’ of the people of Bangladesh.\textsuperscript{1513}


\textsuperscript{1505} Province of Bengal was constituted under the \textit{Government of India Act 1935}.

\textsuperscript{1506} \textit{Indian Independence Act} s 2(2)(a).

\textsuperscript{1507} \textit{Indian Independence Act} ss 2(1), 3(1), 3(3)(b).


\textsuperscript{1509} At the time of 1970 elections the people of East Pakistan represented over 56% of the total population of Pakistan; J Castellino, ‘The Secession of Bangladesh in International Law: Setting New Standards’ in Ko Swan Sik and Surya Subedi (eds), \textit{Asian Yearbook of International Law} (Kluwer Law International, 1997) 83, 87.


\textsuperscript{1511} Ahmed, \textit{Bangladesh: Past and Present}, above n 1510, 306–7; Bureau of South and Central Asian Affairs, \textit{Background Note}, above n 1510.


\textsuperscript{1513} Billah, above n 1512, 2; see also Castellino, above n 1509, 84; Mijarul Quayes, ‘Opportunity Bangladesh — Our Freedom Struggle: An Aesthetic Celebration’ (Bangladesh High Commission in Singapore, 2010) 16.
The pace of this historical development can be divided into five periods — Hindu period, Muslim Period, British period, Pakistani period, and of the period of an independent Bangladesh. Thus legal system of Bangladesh ‘passed through various stages and gradually it developed as a continuous historical process’. The process of evolution has been partly indigenous and partly foreign, and the legal system of the present day stems from a ‘mixed’ system. Although the legal principles and concepts have been modelled on both Indo-Mughal and English law, the main structure and legal principles of the Bangladeshi legal system is derived from the English common law system. Gradually the country inherited the judicial system and court structure created by the British and adopted them into its own judicial system with some modifications.

The Constitution of Bangladesh is the supreme law of the Republic. Before the Constitution came into force, Bangladesh was governed by a de facto government from 16 December 1971, under three constitutional documents, the Proclamation of Independence, the Laws Continuance Enforcement Order 1971 and the Provisional Constitution Bangladesh Order 1972. The Constitution came into force on 16 December 1972 and the de jure government was formed for this country. The entire legislative, executive and judicial activities of the state are now guided and regulated by this Constitution.

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1515 Ibid 6.
1516 Ibid.
1517 Azizul Hoque, The Legal System of Bangladesh (Bangladesh Institute of Law and International Affairs (BILIA), 1980) 1.
1518 Constitution of Bangladesh art 7.
1519 'De facto' government is a that which has taken the place of another regular government and ‘exercises sovereignty over a nation’: Henry Campbell Black, Black's Law Dictionary (West Publishing, 8th ed, 2004) 716; for further details see Herbert W Briggs, 'De Facto and De Jure Recognition: The Arantzazu Mendi' (1939) 33 American Journal of International Law 689, 689.
1521 Now it has been repealed. For further details, see Constitution of Bangladesh art 151. See also Kamal, above n 1519.
1522 Ibid.
1523 ‘De Jure’ government is a functioning government that is legally established’: Black, above n 1497; see also Briggs, above n 1497.
1524 Kamal, above n 1519.
The present legal system owes much to the British colonial administration, and is based on English common law, which belongs to the common law family. In the judicial structure of Bangladesh, the Supreme Court is the highest judicial institution. This highest judicial institution comprises two divisions, the Appellate Division (AD) and the High Court Division (HCD). Apart from these, there are some subordinate courts, which are structured at district level. They are called the ‘lower judiciary’. The justice delivery system at the district level can be divided in two parts, namely the civil and criminal justice delivery systems. The government of Bangladesh, since its independence, has been trying to give a good shape to court management and administration so as to ensure justice and eliminate crime and corruption. The sources of law consist of the Constitution, legislation, case law or precedent, Sharia (as the personal law for Muslims), and Hindu customs and tradition for Hindu community, and various other customs, which have been practised from ancient times, expert opinion, and juristic writings.

As has been discussed in the previous chapter, the overall human rights situation is not the same around the world. It varies from country to country. What types of human rights a state or government is able to provide for its citizen as well as foreign nationals, and to what extent those rights are able to be provided, depends on a
number of factors. Some countries may provide most of the globally accepted human rights but others are able to provide only a few of them. For example, when many countries have already banned death penalty or are in the process of banning it, China, ‘continues to make extensive use of the death penalty, including for non-violent crimes’. There ‘[t]he death sentence continues to be imposed after unfair trials’ and the country’s statistics on the imposition of death sentences and their execution remain ‘classified as state secrets’.\textsuperscript{1537} All of which is, of course, a major example of human rights violation. In the case of Australia, the death penalty was last used in 1967 with the execution by hanging of Ronald Ryan, who had been convicted shooting and killing a prison officer’. More recently, in what has been termed a ‘largely symbolic’\textsuperscript{1538} gesture — given the that the state by state abolition that was completed by 1984 — the Commonwealth passed legislation amending the \textit{Penalty (Abolition) Act 1973} (Cth), and prohibited capital punishment in all states and territories of Australia ensuring it could not be reinstated in any state or territory.\textsuperscript{1539}

The following section will discuss and analyse how far the Bangladeshi government has been able to provide and ensure basic human rights for its citizens. First, it will investigate the basic human rights situation in general. Subsequently, it will examine the enjoyment of genetic privacy rights by Bangladeshi people in particular. Finally, the Chapter will analyse the extent to which human rights and privacy are ensured or violated in the process of forensic use of DNA data in Bangladesh. The investigation of the overall human rights situation will also highlight the country’s economic and technological capacity, including social and cultural responses in this country in regard to adapting to new technology (in this instance, DNA testing and analysis).


6.1.3.2 Human Rights Situation in Bangladesh

The signing of the *Charter of the United Nations* in 1945\textsuperscript{1540} was indeed a landmark in the annals of internationalisation of human rights.\textsuperscript{1541} Bangladesh has been a member of United Nations (UN) since its independence. It became the 136\textsuperscript{th} member of the UN on 17 September 1974.\textsuperscript{1542} Bangladesh is party to ‘the seven core human rights treaties ‘which set legal standards for states parties for the promotion and protection of human rights’.\textsuperscript{1543} The *International Covenant for Civil and Political Rights (ICCPR)* is considered the most influential human rights mechanism of the UN for the recognition and protection of civil and political rights. Through the ratification of this *Covenant*, Bangladesh has undertaken to respect and to ensure all individuals’ civil and political rights in areas that comprise its territory and those subject to its jurisdiction.\textsuperscript{1544} Moreover, the country has a constitutional obligation to recognise and protect all fundamental rights of its citizens.\textsuperscript{1545} Therefore Bangladesh is under an obligation to guarantee all kinds of human rights (including the right to privacy) both nationally\textsuperscript{1546} and internationally.\textsuperscript{1547} Although Bangladesh is under an

\textsuperscript{1540} *Charter of the United Nations* signed 26 June 1945 1 UNTS XVI (entered into force 24 October 1945).
\textsuperscript{1541} Borhan Uddin Khan highlighted that:
By Article 55 and 56 of the *Charter of the United Nations* member states pledged themselves to take joint and separate action in co-operation with the United Nations to achieve respect for human rights.
\textsuperscript{1542} GA Res 3203 (XXIX), 29\textsuperscript{th} sess, 2233\textsuperscript{rd} plen mtg, UN Doc A/RES/3203 (17 September. 1974).
\textsuperscript{1543} Human Rights Library University of Minnesota, 'Concept Paper on the High Commissioner's Proposal for a Unified Standing Treaty Body' (UN Doc HRI/MC/2006/CRP1, 14 March 2006) [3]. The seven core instruments (and the dates of Bangladesh’s adherence) are: The conventions and the dates of its adherence are: *International Convention on the Elimination of All Forms of Racial Discrimination (ICERD)* is 11 June 1979, the *Convention for the Elimination of all forms of Discrimination against Women (CEDAW)* 6 November 1984, the *Convention for the Rights of the Children (CRC)* 3 August 1990, both the *Conventon against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (CAT)* as well as the *International Covenant on Economic Social and Cultural Rights (ICESCR)* 5 October 1998, the *International Covenant for Civil and Political Rights (ICCPR)* 6 September 2000. The country has only signed the *International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families (ICRMW)* (7 October 1998); Geneva Academy of International Humanitarian Law and Human Rights, *Bangladesh International Treaties Adherence* (6 December 2011) Geneva Graduate Institute of International and Development Studies, Rule of Law in Armed Conflicts Project (RULAC) <http://www.adhgeneve.ch/RULAC/international_treaties.php?id_state=22>; see also Borhan Uddin Khan and Muhammad Mahbubur Rahman, 'Human and Minority Rights in Bangladesh' in Rainer Hofmann and Ugo Caruso (eds), *Minority Rights in South Asia* (Peter Lang, 2011) 85, 86.
\textsuperscript{1545} *Constitution of Bangladesh* arts 26–44.
\textsuperscript{1546} For further details see section 3.1.3.3 of Chapter 3.
obligation to ensure a number of human rights for its citizens, the country does not and cannot readily enforce those rights for its citizens. Enjoyment of human rights by Bangladeshi people mainly depends on factors including the country’s constitutional history, government structure, political stability, and socio-economic conditions. Moreover, though Bangladesh has become party to some core human rights conventions or treaties, their impact has not materialised or been felt yet within the Bangladeshi jurisdiction.

Before as well as after the nation’s independence, the people of Bangladesh were continually the victims of breaches of civil, political, economic, social and cultural rights. An analysis of the constitutional history of Bangladesh reveals that the country can be characterised as a ‘twice-born nation’. This is because at first it was suppressed and oppressed under the British colonial rule and gained independence in 1947. The British partitioned this region mainly based on religion just prior to independence being granted to what had been previously known as India, such that the ostensibly Muslim-majority areas that were located in the northwest and northeast of British India became West and East Pakistan, respectively. The main differences of the two parts of Pakistan were that East Pakistan was separated by nearly 1 600 km (1 000 ml) of Indian Territory from West Pakistan and they also had a different language, culture, and traditions that reflected their different ethnicity. The only thing in common was their religion. In the years following Partition, West Pakistan suppressed and dominated economically, culturally and politically the East Pakistan (what is now known as Bangladesh). Gradually, continued suppression sharpened an awareness of these differences among many East Pakistanis and fuelled Bengali nationalism and demands for greater autonomy. The successful war of liberation against Pakistani troops

1547 For further details about International Norms and Standards on Privacy, see section 3.1.3.2 of Chapter 3.
1548 Panday and Mollah, above n 1514, 7.
1549 See section 6.1.3.1 of this Chapter.
1551 Encyclopedia of the Nations, above n 1550.
1552 Tanweer Akram, Birth of Bangladesh: Bangladesh and Pakistan (5 November 2011) Virtual Bangladesh <http://www.virtualbangladesh.com/history/overview_akram.html>; see also Encyclopedia of the Nations, above n 1550; Mohammad Bari, A Brief History of the Bangla Language
(referred to earlier) signalled the second birth of this nation and this time Bangladesh born as an independent and sovereign state.

While many nations (including to some extent Bangladesh) languished under military dictatorships subsequent to independence from colonial rule, [t]he history of political experience of Bangladesh indicates that people of Bangladesh want democracy, political freedom and rights, as well as development'.

During the colonial regimes of the British (1757–1947) and Pakistan (1948–1971), the people of Bangladesh could not exercise or enjoy democracy, political freedom, basic human rights, and development. Such deprivation continued even after independence. Democracy was not established readily; rather, the ‘search for political democracy [by the masses] has suffered from interruption’. The country experienced a considerable period of military rule, both before and after independence. Under the control of (West) Pakistan’s ruling military elite as part of Pakistan from 1958-62 and again from 1969 to independence, it was then governed for nearly 15 of the first 20 years of its existence by the two military rulers. Martial law was declared after the assassination of the ‘Father of Nation’, Sheikh Mujibur Rahman in 1975 and the army emerged as a powerful political force, continuing in power until 1981. The second period of martial law was imposed by H M Ershad in 1982 and his dictatorship continued until 1990. For these two periods, the parliament was dissolved, the Constitution suspended and all political activities banned. All the fundamental rights were suspended during these two military government regimes. Democracy was restored only after the Revolution of 1990 and people of


Islam, above n 1553.

Bureau of South and Central Asian Affairs, Background Note, above n 1510.


BBC News, Bangladesh Profile, above n 1533.

Halim, above n 1534, 461.

BBC News, Bangladesh Profile, above n 1533.
Bangladesh started to feel the essence of democracy. The Bangladeshi people, therefore, had long been denied basic human rights. Their inability to enjoy such rights stretched from within the British period until the late 20th century (that is, to 1990). Yet the rights to self-determination, expression, language, representation, food and shelter — that is, human rights — remained at the heart of the people’s aspirations. It was the curtailment of such rights that led to revolution, and ultimately, a democratic Bangladesh where once again people sought to enjoy and exercise their human rights.

Such rights are attempted within a difficult context. Apart from its stormy political history, the country ‘is one of the world’s most densely populated … Poverty is deep and widespread; almost half of the population lives on less than one dollar a day’.1561 The basic needs (food, clothing, shelter, health care and education) are not guaranteed for all Bangladeshis. That’s why these basic needs become the part of ‘fundamental principles of state policy’1562 rather than fundamental rights1563 under the supreme law of this country — the Constitution. In addition, corruption is another critical issue for Bangladesh. It is also another contributing factor to the violation of human rights. It can be successfully argued that there is a strong link between the two.1564 These factors (poverty and corruption) also exacerbated the human rights violations in Bangladesh. Basic human rights (civil-political, economic-social-cultural rights) cannot be guaranteed for Bangladeshi citizens, even to the present time.

In the judicial system, in order to ensure a fair trial and justice, the use of DNA data and DNA facilities has begun in Bangladesh as in other countries. With the introduction of this technology, new dimensions of human rights violations (that is, genetic privacy) – and new concerns in that regard have emerged in the Bangladeshi jurisdiction. The concept of ‘right to genetic privacy’ is very new for many countries

1561 Ibid.
1562 See generally Constitution of Bangladesh arts 8, 15.
1563 See generally ibid arts 26–44.
(including Bangladesh). Privacy protection with regard to the use of DNA samples and profiling is seen, therefore, to be a significant problem for Bangladeshi society.

After discussing human rights situation, it can be argued that the basic human rights scenario of Bangladesh is not satisfactory. The concept of ‘right to genetic privacy’ has not as yet received any factual or legal recognition. Section 6.1.4 will examine the NFDPL from different perspectives (its nature, composition, functions, scope of its services, challenges, as well as problems). It will also investigate and determine whether and to what extent and in what manner the usual practice of the NFDPL, use of DNA sample and profile in administering justice poses a risk to privacy. It will then analyse whether there is any gap between developed and developing countries, to be more precise, whether the Bangladeshi DNA Laboratory is facing any challenges in financial and technological terms compared to the NDNAD of the UK.

6.1.4 NATIONAL FORENSIC DNA PROFILING LABORATORY (NFDPL)

6.1.4.1 Background, Nature, Operation and Use of the NFDPL

Aim of this section is to discuss the background, nature, and the forensic use of DNA data in Bangladesh. It will also examine issues and challenges faced by the NFDPL. Apart from case study, as has been mentioned earlier data analysis is conducted on the basis of the qualitative method (that is, responses to interviews conducted with 9 participants from the NFDPL, comprising two management staff, and seven scientific and technical staff), as well as the quantitative method (that is, a survey conducted with the same participants). In order to ensure the anonymity of all interview respondents’, the respondents’ are identified by an alpha-numerical code (with the abbreviation ‘R’ standing for respondent and an assigned participant number for each respondent). Interview respondents are referred to as R1, R2, R3, R4, R5, R6, R7, R8, and R9 respectively. Pinpoint references to a particular page of the interview transcript are represented by an additional number. For example, the comment/quotation taken from the second page of the transcript of the interview with respondent R1 would be referenced as R1.2. Additionally, within any quote or extract from a transcript, the use of italics indicates emphasis, and ellipsis (…) indicates that material has been omitted to aid readability.
The case study and other data collection methods are mainly focused on the overall management and administration of the NFDPL (which includes sample collection and retention, use of DNA data for justice delivery purposes, legislative mechanism, laboratory access rule, and the rights of the parties). Finally, the collected and analysed data have determined the outcome of the case study, in regard to issues about ‘human rights and privacy violations’ as well as the ‘gap between developed-developing countries’ (that is, between the UK and Bangladesh).

(a) Background

The forensic medical service of Bangladesh includes clinical forensic medicine and forensic pathology. The service is provided by the Bangladeshi government through the Ministry of Health.\textsuperscript{1565} Forensic science involves a network of many laboratories, scientists and experts from different fields.\textsuperscript{1566} The DNA laboratory is a part of this very intricate scientific network.\textsuperscript{1567} Under Bangladeshi law, all unnatural deaths (including serious criminal cases such as rape, and murder) that are reported to the police are subject to forensic investigation.\textsuperscript{1568} Similar to the law of many other countries, the criminal law of Bangladesh defines the offences and prescribes punishments, as well as the procedure for investigation of crime. In Bangladesh, the legal basis for these forensic investigations is the \textit{Code of Criminal Procedure 1898}\textsuperscript{1569} and the \textit{Evidence Act 1872}\textsuperscript{1570}.

Owing to the revolutionary potential of the use of DNA techniques in identifying offenders as opposed to the methods of traditional investigation, Bangladesh — like many other countries — started to use this new technology.\textsuperscript{1571} The Multi-Sectoral Programme on Violence against Women (MSP-VAW) is one of the significant initiatives for the introduction of DNA technology in Bangladesh. As a part of this

\textsuperscript{1566} Karagiozis and Sgaglio, above n 1491; see also WiseGeek, \textit{What is a Forensic Investigation?}, above n above n 1491.
\textsuperscript{1567} Dyuti Monishita, 'Indelible Fingerprints', \textit{New Age Xtra} (online) 9 May 2008 <http://www.newagebd.com/2008/may/09/may09/xtra.html>.
\textsuperscript{1568} For further details about the forensic investigation process in Bangladesh, see Rahman, Osman and Mahmud, above n 1565, 61–2. See also Muhammad Nurul Islam and Mohammed Nasimul Islam, ‘Forensic Medicine in Bangladesh’ (2003) 5 \textit{Legal Medicine} S357, S357.
\textsuperscript{1570} \textit{Evidence Act} ss 45–51.
\textsuperscript{1571} Raza, above n 1492.
programme, the NFDPL was set up on 23 January 2006 at the forensic medicine department of the Dhaka Medical College. The MSP-VAW is the joint initiative of the governments of Bangladesh and Denmark under the Ministry of Women and Children Affairs. It is being implemented through bilateral agreement between two countries. Denmark’s governmental aid agency, Danida, provides financial and technical assistance all over the world, including Bangladesh, under the theme of ‘human rights and good governance’, which includes ‘access to justice’. Under the ‘access to justice’ theme, Danida has established the MSP-VAW project. The pilot and first phase of the project took place from May 2000 to December 2003 with an extension from January 2004 to June 2008. The project is now in its 2nd phase, which began in July 2008 and continues until June 2011. The Danish government has expressed its willingness to support the 3rd phase (July 2011–June 2016) of the MSP-VAW under Human Rights and Good Governance III sectoral programme.

The NFDPL was, therefore, initially established under the MSP-VAW project with financial and technical support from the Danida, and physical facilities, logistics for establishing the laboratory having been provided by the government of Bangladesh. This is the only DNA laboratory that has been established in Bangladesh for assisting the country’s investigation process and judicial system.

(b) Objective
The main objective of this laboratory is to assist and serve the justice delivery system of Bangladesh. Initially the lab had been established in order to provide legal support

1572 National Forensic DNA Profiling Laboratory, above n 90, 6; see also Raza, above n 1492.
1575 Danida is the entity (parallel to AusAid in Australia) that implements Danish international development cooperation conducted under Denmark’s Ministry of Foreign Affairs, for further details see Ministry of Foreign Affairs of Denmark, DANIDA: Activities (6 December 2011) <http://um.dk/en/danida-en/activities/>.
1576 Hossain, above n 1574.
1577 Ibid.
1579 R 1.3.
for female victims of various offences, particularly sexual assaults.\textsuperscript{1580} This was the case because one of the main shortcomings of the criminal justice system in Bangladesh was a lack of evidence to prove sexual assaults. ‘Many sexual offences occurred\textsuperscript{1581} daily but those cases could not be proved due to a lack of evidence’.\textsuperscript{1582} The NFDPL is a major step in ensuring a speedy and fair trial for those who perpetrated violence against women.\textsuperscript{1583} Gradually, because of its significant contribution in detecting criminals with accuracy,\textsuperscript{1584} the scope of its service has been expanded. At present, various other civil and criminal cases have been resolved using this laboratory.\textsuperscript{1585}

(c) Nature and Composition

The NFDPL is divided into three sections:\textsuperscript{1586}

- **Screening Lab**: The function of the screening lab is to check for the presence of biological evidence — such as, blood stain, semen, saliva or other bodily substances — which is recovered or collected from crime scene or victim. Apart from the NFDPL, there are five other divisional screening labs across the country.\textsuperscript{1587}

- **Extraction Lab**: After screening, collected evidence or samples are sent to the NFDPL for further examination. When the source of DNA is detected, the samples are sent to the extraction lab for DNA extraction.\textsuperscript{1588}

\textsuperscript{1580} Multi-Sectoral Programme on Violence Against Women et al, *National Forensic DNA Profiling Laboratory* (5 November 2011) <http://www.mspvaw.org.bd/files/wsdl.pdf>; see also R 1.1, R 2.6.

\textsuperscript{1581} A symposium was organised on February 17 by four divisions of BRAC at the BRAC Centre Inn on the theme “Celebrating Development, Celebrating Women.” It was held to commemorate 100 years of international Women’s Day and 35 years of the ratification of *CEDAW* (*Convention on Elimination of all Forms of Discrimination against Women*). The results of research by BRAC on 3000 human rights violations between 2006-2009 showed that the most frequent crime was rape (31%), followed by murder (25%), acid throwing (15%), suicide (12%), physical torture (8%) and attempts to rape (7%). Half of the rape victims were below 15 years of age. *DS 18.02.10*: Hotline (HRs) Bangladesh, *Teenagers Most Sexually Harassed* (6 December 2011) <http://hotlinebd.org/?p=230>.

\textsuperscript{1582} R 1.1.

\textsuperscript{1583} Staff Correspondent, ‘First DNA Lab Starts’, above n 1493.


\textsuperscript{1585} Multi-Sectoral Programme on Violence Against Women, *National Forensic DNA Profiling Laboratory*, above n 1573.

\textsuperscript{1586} National Forensic DNA Profiling Laboratory, above n 90.6.

\textsuperscript{1587} Ibid 6–7; see also Multi-Sectoral Programme on Violence Against Women, *NFDPL*, above n 1573.

\textsuperscript{1588} Ibid 7.
• **Analysis Lab**: After extraction, the extracted DNA is sent to the analysis lab for PCR amplification and further downstream application that yields the ultimate DNA profile.\(^{1589}\)

Currently, the NFDPL is headed by the National Technical Advisor, Dr Sharif Akhtaruzzaman, who carries the overall responsibility for operations. He is supported by scientific officers, laboratory technicians and other staff with appropriate training and background. As has been mentioned earlier, in order to extend the service of this DNA laboratory across the country and also to make this service more widely available for the population, there are five divisional DNA screening laboratories, each of which has been established in a divisional medical college hospital.\(^{1590}\) These laboratories accept cases from remote areas and conduct the preliminary screening. They subsequently send the samples collected to the NFDPL for DNA analysis.\(^{1591}\) The final opinion always comes from the NFDPL, which is the main laboratory (in Dhaka). Six one stop crisis centres (OCCs) have been established, one at each of six divisional public hospitals, in order to assist the victim from the grass roots level and from the remote areas.\(^{1592}\) These OCCs provide medical treatment, security, and counselling services to the victims of various sexual and physical assaults.\(^{1593}\)

The laboratory provides services to law enforcement agencies and the judiciary to help solve various violent crimes, such as, murder or rape. DNA analysis can also help solve disputes arising over issues like paternity, maternity, immigration or inheritance, and determining the identity of missing children, disaster victims or mutilated bodies. The laboratory is well equipped to provide all kinds of DNA testing services related to civil and criminal case investigation.\(^{1594}\) More than 50 per cent of tests undertaken are in relation to paternity cases and the rest are related to

\(^{1589}\) Ibid.
\(^{1590}\) Rajshahi Medical College Hospital, Chittagong Medical College Hospital, M AG Osmani Medical College Hospital, Sylhet, Sher-E-Bangla Medical College Hospital, Barisal, and Khulna Medical College Hospital. For further details, see Multi-Sectoral Programme on Violence Against Women, *NFDPL*, above n 1573.
\(^{1591}\) Ibid.
\(^{1592}\) Hossain, above n 1574.
\(^{1593}\) M E Khan et al, 'A Situation Analysis of Care and Support for Rape Survivors at First Point of Contact in India and Bangladesh' (United States Agency for International Development (USAID) and Frontiers, September 2008) 21.
\(^{1594}\) Multi-Sectoral Programme on Violence Against Women, *NFDPL*, above n 1573.
murder, rape, identification of corpses, sibling testing, immigration disputes and so on. It takes around one month to do the analysis. Up until November 2011, the NFDPL has completed DNA analysis for 1516 cases, consisting of 5702 DNA samples.\textsuperscript{1595}

Table 2: Categories of DNA Test up to November 2011\textsuperscript{1596}

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Description</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Paternity Test</td>
<td>20</td>
<td>72</td>
<td>105</td>
<td>146</td>
<td>100</td>
<td>135</td>
<td>578</td>
</tr>
<tr>
<td>2</td>
<td>Murder</td>
<td>2</td>
<td>8</td>
<td>20</td>
<td>25</td>
<td>20</td>
<td>24</td>
<td>99</td>
</tr>
<tr>
<td>3</td>
<td>Rape</td>
<td>3</td>
<td>90</td>
<td>154</td>
<td>223</td>
<td>162</td>
<td>166</td>
<td>798</td>
</tr>
<tr>
<td>4</td>
<td>Identity</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>Immigration</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>6</td>
<td>Burglary</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Sibling</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>28</td>
<td>175</td>
<td>284</td>
<td>404</td>
<td>295</td>
<td>330</td>
<td>1516</td>
</tr>
</tbody>
</table>

The NFDPL does not accept private cases or request from private individuals. It only accepts cases referred by law enforcement agencies or courts for DNA analysis. After completion of the DNA analysis, the report is submitted to the forwarding authority in a sealed cover.

(d) Oversight, Operation and Management

Operations and Management

Along with its small number of staff, the organisational hierarchy for the NFDPL has been framed as follows: at the top there is a laboratory head; below that, there are posts for scientific officers; and under those positions, there are laboratory technicians; and then there are also other staff (for example, computer operators, clerical positions, and cleaners)\textsuperscript{1597} at the bottom of that hierarchy. The staff are appointed by the government under this project (these positions are currently only temporary in conformity with the policy of the project). Their organisational structures are given below:

\textsuperscript{1595} Ibid.
\textsuperscript{1596} For further details see ibid.
\textsuperscript{1597} R 1.1.
Apart from that, there is a Project Implementation Unit (PIU) to initiate and facilitate the renovation, construction and equipment of OCCs, and DNA laboratories. As there is no approved permanent, organisational hierarchy, laboratory staff are assured of their job only during the lifetime of the project.

_Ethical Oversight or the Supervisory Body_

The supervisory body for the NFDPL is called ‘DNA Executive Board’ (DEB), which consists of a chairman\(^{1598}\) and 6 other members\(^{1599}\). The Board is charged with the responsibility of supervising overall activities of the NFDPL. The DEB convenes a meeting to review activities of the NFDPL twice a month.\(^{1600}\) In this regards R2 observed:

> There is a supervisory body for the NFDPL … the DNA Executive Board (DEB). How the lab works, how samples are collected and what the DNA database looks like, the accountability of the lab etc are monitored by this Board. That means all functions of the lab are monitored by the DEB. Every activity of the lab is required to be reported to the Board. When there is any new activity of the lab, the Board calls a meeting. [However] \[r\]eports of regular day to day activities are not required to be submitted to the Board.\(^{1601}\)

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\(^{1598}\) Principal, Dhaka Medical College, see National Forensic DNA Profiling Laboratory, above n 90, 5.

\(^{1599}\) Representatives from the Ministry of Women and Children Affairs, the Ministry of Health and Family Welfare, the Ministry of Law, Justice and Parliamentary Affairs, the Ministry of Home Affairs, the Head of the Department of Forensic Medicine, the National Technical Advisor (NFDPL) and the Project Director of the MSP-VAW: ibid.

\(^{1600}\) R 1.3.

\(^{1601}\) R 2.7.
Technical Teaching Team (TTT)

In terms of skilling personnel for the tasks associated with the new technology, there is:

[a] three member team … responsible for training on national forensic DNA Profiling. The members of the team are: (1) National Technical Advisor of the NFDPL (2) Head of the Department of Forensic Medicine, Dhaka Medical College (3) Director of the Centre for Medical Education.1602

There is one more committee for the divisional DNA Screening Laboratories.1603

(e) Technology in Use

In order to analyse the DNA, the NFDPL mainly uses PCR1604 based STR marker technology. DNA profiling via PCR method is a quick way of identifying people by comparing sequences of STR regions. Paternity dispute cases are investigated in Bangladesh using 10 autosomal STR loci.1605 In order to do the PCR test, different kits are used, for example, ‘Identity filer’, ‘y filer’, ‘X-plex’, ‘SGM+’. Among these, ‘identity filer’ is the latest method and most frequently used one.1606 R5 has highlighted that:

If there is any confusion about a particular method used and also to draw an accurate conclusion, generally, we use more than one method. We also use another kit, depending on the type of case.1607

(f) Uses and Benefits of the NFDPL

The NFDPL helps Bangladeshi police investigators to prove the guilt of a suspect or exclude the innocent in regard to a criminal charge. It may also assist courts by providing them with conclusive evidence of the suspects’ involvement in the offence or at least their presence at the scene. Therefore, it minimises doubt as well as preventing errors of judgment in criminal cases. In this regard, North South University, Bangladesh, Foundation Chairman, M A Kashem, said at a 2010 seminar

1602 National Forensic DNA Profiling Laboratory, above n 90, 5.
1603 Ibid.
1604 For further details about PCR method see section 2.1.3.3(ii) of Chapter 2.
1606 R 3.12, R 4.17, R 6.27.
1607 R 5.21.
on ‘DNA Technology in Criminal Investigation’ ‘DNA profiling has the potential to revolutionise the country’s crime investigation scenario’. 1608

DNA testing also minimises the scope for corrupt police officers to execute random arrests in a criminal case that lacks clues. The DNA lab works as a shield against the misuse of police powers which will ultimately result in building positive image of police department as an investigating authority. 1609 All interviewees agree that the NFDPL is very important for the justice delivery system. The service and use of this laboratory has also expedited the activities of the judiciary, and people are getting justice smoothly as well as fairly. It has also reduced case related costs. 1610 Most notably, R2 underlines that ‘this remarkable technology provides exclusion as well as positive identification with virtually 100 per cent accuracy’. 1611

At present, the NFDPL is providing services in resolving disputes over paternity 1612, identification of rapists and or murderers 1613, disaster victims and or missing persons 1614, to prove innocence 1615, to determine sibling disputes, 1616 immigration disputes 1617 and so on. 1618 According to Prof Sharif Akhteruzzaman:

1608 Staff Correspondent, 'DNA Profiling Can Revolutionise Crime Investigation Scenario', The Daily Star (online) 19 February 2010. The Seminar was jointly organised by the Department of Life Sciences and Life Sciences Club at the NSU, Dhaka.
1609 Raza, above n 1492.
1610 R 1.4, R 2.8, R 3.15, R 4.20, R 5.25, R 6.30, R 7.34, R 9.42.
1611 R 2.8.
1612 Recently, the use of DNA profiling revealed that a Chittagong couple’s two-year-old daughter is not actually their daughter, but an infant who was mistakenly swapped with their actual son in a hospital ward, for further details see Staff Correspondent, ‘DNA Profiling Can Revolutionise Crime Investigation Scenario, above n 1608. In another case, the NFDPL determined the paternity of a child of a household maid, 24 year old Rahima who had filed a paternity suit for her 10 months old baby. The Sylhet District Court referred the case to the NFDPL on 20 February 2009. The lab returned the results to the Balaganj police station on 29 March 2009. These revealed that it was Saimullah — her employer and chairman of local union in Sylhet who had dismissed her when the pregnancy was disclosed — who is the child’s father, see Taslima Miji, 'DNA Lab to Rahima’s Rescue: Raped Maid Set to Win Paternity Dispute', The New Age (online) 17 April 2006.
1613 In an horrific murder case of a 19 year old college student, Barnali Ghose, the Khulna Divisional Speedy Trial Tribunal ‘sentenced two people to death and four others to life imprisonment for killing [her] … after [the] rape in Rampal Upazila of Bagerhat District in 2007. The Tribunal also fined the lifers Tk 10,000 each, in default they are to suffer another year in jail’: Staff Correspondent, 'Barnali Rape, Murder in Bagerhat: Two to Die, 4 Get Life', The Daily Star (online) 31 August 2010 <http://www.thedailystar.net/newDesign/news-details.php?nid=153028>.
1614 The corpses of Bangladesh Rifles (BDR) soldiers (missing after the BDR mutiny in February 2009 at the BDR headquarters in Dhaka and later found in mass graves) were identified through DNA testing. See generally Itekhar Alam, Questions Plague Border Guards’ Mutiny in Bangladesh (8 March 2009) Minority Dreams <http://minoritydreams.com/tag/bangladesh-rifles/>; see also Staff Correspondent, 'DNA Profiling Can Revolutionise Crime Investigation Scenario, above n 1608.
DNA profiling is being increasingly used to identify criminal suspects as well as in many other fields throughout the world. Apart from criminal investigations, DNA profiling is used in paternity tests, immigration disputes, establishing family links, inheritance disputes and identifying nameless victims from accidents and disasters.\footnote{1619}

In addition, the NFDPL assists in identifying stolen property through DNA testing, as ‘DNA can be used to make property [safer] and aid [its] recovery from thieves’.\footnote{1620} In civil cases, the DNA test result also helps in determining chastity.\footnote{1621} The NFDPL is therefore supporting the civil courts ‘to dispose of thousands of pending cases where inheritance, paternity, and chastity’ are in dispute.\footnote{1622}

Furthermore, there is a plan to establish a database for convicted offenders under the NFDPL management. Any future criminal activities can then be compared (matched) with the stored profiles. This will help dispose of criminal cases quickly, thereby saving time, money and other resources of the government.\footnote{1623}

The following section will scrutinise current practices of the NFDPL (such as DNA sample collection, DNA analysis, storage and or removal, and, finally, right to


\footnote{1616} In 2006, in a sibling and parentage dispute, the High Court Division (HCD) of Bangladesh Supreme Court (SC) asked the NFDPL authorities to carry out DNA tests under the supervision of the SC authorities upon a petition filed by two prominent local NGOs (the Bangladesh National Women’s Lawyers Association (BNWLA) and the Bangladesh Society for Enforcement of Human Rights (BSEHR)). A medical board collected samples for DNA test from seven children of former Deputy Inspector General (DIG) of police Anisur Rahman following the court order. The DNA tests proved that they are not siblings. for further details see Staff Correspondent, ‘Ex-DIG’S 7 Kids Go Under DNA Test’, \textit{The Daily Star} (online) 7 August 2008 <http://www.thedailystar.net/newDesign/news-details.php?nid=49321>. In February 2011, a warrant was issued for the arrest of his wife, Anwara Rahman, ‘in connection with a case filed for stealing seven children in 2006’. A similar warrant had been issued for Anisur Rahman in September 2010, see Court Correspondent, ‘Child Stealing Case: Warrant Issued against DIG’s Wife’, \textit{The Daily Star} (online) 25 February 2011 <http://thedailystar.net/newDesign/news-details.php?nid=175471>.

\footnote{1617} The DNA service can also be used to settle an immigration dispute, and also to establish relationship in case of family reunification, see generally Janet M Ihenacho, ‘The Effect of the Introduction of DNA Testing on Immigration Control Procedures: Case Studies of Bangladeshi Families’ (Research Paper In Ethnic Relations No16, Centre for Research in Ethnic Relations, University of Warwick, November 1991) <http://www2.warwick.ac.uk/fac/soc/crer/research/publications/research_papers/rp_no.16.pdf>.

\footnote{1618} National Forensic DNA Profiling Laboratory, above n 90, 6; see also Multi-Sectoral Programme on Violence Against Women, \textit{NFDPL}, above n 1550.

\footnote{1619} Staff Correspondent, ‘DNA Profiling Can Revolutionise Crime Investigation Scenario’, above n 1608.

\footnote{1620} Raza, above n 1492.

\footnote{1621} A woman’s sexual faithfulness to her spouse. The paternity of a child may determine this issue.

\footnote{1622} Raza, above n 1492.

\footnote{1623} Ibid.

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6.1.4.2 Existing Practices: Governance of the NFDPL

(a) Sample Collection

Detailed information has been provided by interview respondents regarding the sample collection process in the NFDPL. Almost all scientific officers and laboratory technicians have been working there for more than one year. Some of them have been working there since the establishment of the laboratory. There are two groups of people who are involved in the DNA sample collection, analysis, storage or removal, and submission of the final report:

- Scientific officers: their job is to supervise technicians in the whole process of sample collection, DNA extraction, and analysis. Some of these officers conduct the correspondence with outside organisations or bodies.

- Laboratory technicians: their function is to assist the scientific officers in the process, for instance, in collecting sample, completing the forms, and extracting DNA.

In general, scientific officers and laboratory technicians are assigned the duties of handling cases related to DNA testing and profiling. For every case, one scientific officer and one laboratory technician are assigned. There are two ways of collecting DNA sample:

i. DNA samples are collected from the crime scene by the police. The sample is then passed on to the laboratory staff, and after receiving SOC bodily substance, depending on nature of the crime, they (laboratory staff) complete the prescribed forms. After completing the required paperwork, scientific officers (with assistance of laboratory technicians) undertake the DNA analysis.

1625 R 3.10, R 5.21, R 7.31.
1626 R 4.16.
1627 R 5.21.
1628 R 8.35.
ii. Bodily substances (for example, blood, semen, saliva) can also be collected from body of the suspect or victim by laboratory staff in the presence of police. In this regard R3 reports:

We are only authorised to collect DNA samples from the bodies of victims or suspects inside the lab. We do not collect samples from the crime scene. DNA samples from the crime scene are only collected by the police.\[^{1630}\]

Despite some differences in patterns of response by the interviewees, there were similarities of opinion; for instance, all interviewees are agreed on the DNA sample collection process. Further, a survey conducted in August 2011 with the same nine participants (including management and operational staff) from the NFDPL (hereinafter referred as the ‘survey’). In this survey, 100 per cent respondents are also agreed on this point.

After collecting the DNA sample, the next stage is to start the process of DNA analysis. When the DNA sample is collected, a separate identification number is given for every sample or case. A separate file is maintained for each case and every detail is taken so that each file can be identified separately. After opening the file, the laboratory head assigns each case or file to a team that comprises one scientific officer and one laboratory technician. The team then undertake DNA analysis and they try to complete the analysis and obtain a result within a month. However, if there is any urgency they try to complete it earlier than that. Subsequently, this result is cross checked by the same test being done by another scientific officer. After cross checking, the report is submitted to the laboratory head and once it is approved, the final report is signed by the laboratory head, and assigned scientific officer and is then counter signed by the forensic department head. Once the DNA analysis results are ready for publication, one copy is directly sent to the court. Another copy is given to investigating officer (IO) on his or her request.\[^{1631}\]

The NFDPL procedure of sample collection differs from case to case. In case of parentage testing, blood samples of the mother, child and the alleged father are required. If the collection of blood samples is done outside the laboratory, strict

\[^{1630}\] R 3.10.
\[^{1631}\] All interviewees have a similar view and opinion in this issue.
procedures regarding collection, preservation and transportation of the samples are undertaken by the laboratory staff and by the police departmental officers, separately or together as the case may be.\textsuperscript{1632} If the blood collection cannot be taken or is not possible or unsuccessful for any reason, a buccal (cheek) swab is provided for sample collection.\textsuperscript{1633} A buccal swabs are normally done for DNA testing. A specimen is collected by gently rubbing inside the cheeks with long swabs.\textsuperscript{1634}

In case of a rape or murder, forensic exhibits (for example, clothes worn by the victim, under-garments, bed-sheets, internal vaginal swabs, slides of microscopic examinations along with blood samples of the victim and accused) are collected. In murder cases, forensic exhibits that might be left by the suspects at the scene of crime, together with tissue samples taken from the victim and blood samples from the suspects, are required.\textsuperscript{1635} All samples are required to be accompanied by a forwarding note (Form 1)\textsuperscript{1636} and an identification form (Form 2)\textsuperscript{1637} for each person, duly filed and signed by the donor in the presence of a witness (magistrate or public representative or medical officer). No samples are received by the NFDPL without these documents.\textsuperscript{1638}

(b) Storage and Retention

After DNA sample collection, the next step is storage and retention, including removal and destruction of some of the samples when required. Most biological evidence is preserved and stored in a dry and cold place. Dry samples are kept at room temperature (out of direct sunlight) or are to be refrigerated at 4 degrees Celsius or frozen at -20 degrees Celsius.\textsuperscript{1639} Undried samples (for example, tissue, bones) are kept frozen at -20 degrees Celsius. Liquid blood is kept refrigerated.

\textsuperscript{1632} 'All packages containing DNA analysis report are marked with a case number, police station or court, item number and date. Packages are initialled across the security seal and all samples are sent through police courier': See National Forensic DNA Profiling Laboratory, above n 90, 17; for further details see Multi-Sectoral Programme on Violence Against Women et al, \textit{National Forensic DNA Profiling Laboratory (NFDPL): Procedure for Collection, Preservation and Transportation of Sample for Sample Analysis} (7 November 2011) 1–6 <http://www.mspvaw.org.bd/files/scp.pdf>.

\textsuperscript{1633} National Forensic DNA Profiling Laboratory, above n 90, 14.

\textsuperscript{1634} Ibid.

\textsuperscript{1635} Ibid 13–14.

\textsuperscript{1636} See Appendix E.

\textsuperscript{1637} See Appendix F.

\textsuperscript{1638} National Forensic DNA Profiling Laboratory, above n 90, 13–14.

\textsuperscript{1639} Ibid 16.
Garments with blood stain or semen stain are air dried and stored at room temperature or refrigerated.\textsuperscript{1640}

Results of the DNA analysis or profiling are stored both in the electronic and hard copy versions. Files containing DNA analysis or profiling reports are stored and kept in the personal custody of the laboratory head. Other than scientific officers, no person can access these files. There are six computers for six scientific officers and these computers are protected by password. Electronic copies of the DNA profiling reports are stored in the PCs of the laboratory head and scientific officers.\textsuperscript{1641}

Regarding the retention of DNA samples and profiles, the interview respondents were asked:

\textit{Do you retain DNA sample and profile, If yes, what is the maximum period of data/sample retention at the NFDPL?}

The following information is shared by interviewees\textsuperscript{1642}:

\begin{enumerate}
\item[R1, R2, R7, R8:] Yes, we retain both DNA samples and profiles. We retain DNA samples for 1 year and DNA profiles for an indefinite period of time.
\item[R3:] Yes, our lab retains DNA samples for 1 year and DNA profiles for an indefinite period of time. DNA analysis results are retained both in the computer and paper based files.
\item[R4:] We retain blood samples for 2 years and DNA samples extracted from other bodily substances or biological fluid are retained for 1 year. After completion of 2 years, we destroy those samples. DNA profiles are retained indefinitely.
\item[R5:] Blood samples are retained for 1 year. DNA sample extracted from other bodily substances or biological fluid is retained for 2 years or more than that, it depends on the capacity of our lab. Once the capacity is full then we destroy DNA samples which are 2 years old. We retain DNA profiles for unlimited period of time for convicted offenders.
\item[R6:] We retain DNA profiles for an unlimited time and DNA samples for 2 years.
\item[R9:] We retain other type of samples for 1 year, blood samples for 2 years and DNA profiles for unlimited period of time.
\end{enumerate}

\textsuperscript{1640} Ibid 17.
\textsuperscript{1641} R 3.12, R 4.18, R 5.23, R 6.28, R 7.32, R 8.36, R 9.40.
\textsuperscript{1642} See Appendix A.
The above mentioned responses have highlighted that interview respondents have differences of opinions regarding DNA sample retention period. This argument is also supported by the following survey results:

Table 3: Frequency Distribution of Maximum Period of Retention of DNA Samples

<table>
<thead>
<tr>
<th>Maximum Period of Retention of DNA Samples (in years)</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td>1</td>
<td>11.11</td>
</tr>
<tr>
<td>1–2</td>
<td>5</td>
<td>55.56</td>
</tr>
<tr>
<td>2–3</td>
<td>3</td>
<td>33.33</td>
</tr>
<tr>
<td>Unlimited</td>
<td>0</td>
<td>00.00</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>100.00</td>
</tr>
</tbody>
</table>

After observing the collection and retention of process of the NFDPL, it can be argued that there is no uniform data retention rule or policy for this laboratory. Its staff members have developed a practice or process for DNA collection and retention (how long a sample ought to be retained, and when it has to be destroyed and so on); however, the practice is not consistent over time nor universally adopted. The lack of a standardised policy and practice with regards to the collection process and sample retention period is causing some uncertainty around the sensitive material which is human DNA contained in those samples. If such uncertainty continues, DNA samples, and therefore data able to be derived from such samples, would be able to be exploited or misused more frequently, violating human rights and privacy. Involvement of police in the sample collection process without any accountability is also a great threat for privacy. Section 6.1.5 of this chapter will examine all these issues related to the scope for violation of human rights and privacy while collecting and retaining DNA data in the NFDPL in detail.

(c) Access to Data

After retaining DNA analysis results in the NFDPL, the question arises regarding who should or should not access the DNA data retained in this laboratory. According to current practice of the NFDPL, only the laboratory head can access all data and files related to DNA samples and profiles stored in the laboratory. Where an urgent matter arises and the laboratory head is not available, scientific officers alone are
able to access data and files but only with permission from the laboratory head.\textsuperscript{1643} However, the laboratory does not have any formal access rule or policy to cover such a practice. The NFDPL management and staff simply hope that their practice will be covered by legislation once the draft \textit{DNA Act} is enacted. They expect that their access practice and guidelines will be bit different after its enactment, such that:

[D]uring DNA analysis, all scientific officers and the lab head will have access to all data. But after the analysis is completed and the report submitted, only the lab head will have access to all data related to DNA profiling stored inside the lab.\textsuperscript{1644}

However, the proposed draft \textit{DNA Act} is silent on this issue. Section 40 of the proposed Act only provides that \textit{during criminal case investigation process}, tissue samples, bodily substances or DNA data shall not be disclosed to anybody \textit{other than} a person authorised by the law enforcement agencies government. Section 49 provides sanctions for illegal access to the database. The provision provided in s 40 will keep the door open for the police and government to exercise their power with regards to someone’s sensitive DNA data. The proposed section does not clarify the role of government or persons authorised by government in this process. The need for court access for justice is clear but it is unclear what purpose ‘government’ authorised access would serve, particularly in light of the fact that the term ‘government’ is not defined in the definitions section of the proposed legislation, nor are the roles of authorised persons.

Under existing practice, only laboratory staff members are permitted to access DNA data retained after the trial is concluded. Third parties — particularly law enforcement agencies — are not allowed to access the laboratory, and so cannot access retained data. They can seek a DNA analysis report; and, if law enforcement agencies feel it necessary in the interest of a later case investigation, then they can seek more data under the supervision of laboratory staff. One respondent opines that:

Until now the law enforcing agencies have not expressed much interest in accessing the lab. Apart from that, we have not established the DNA database yet. Once the database is established, then the authority will decide who should have right to access it and who should not.\textsuperscript{1645}

\begin{itemize}
\item \textsuperscript{1642} R 3.12, R 4.18, R 6.28, R 7.32, R 8.37, R 9.41.
\item \textsuperscript{1643} R 5.23.
\item \textsuperscript{1644} R 1.4.
\end{itemize}
Under the existing practice, there is little or no scope for violation of privacy, as most of the third parties (for example, insurance companies, employers) are not very aware of the DNA analysis and its potential uses, and also they do not have right to access the database. Once people know more about this laboratory, then possible implications will arise in regard to possible access by third parties and perhaps in regard to intimidation of staff and/or their families where parties wish to ensure a result pleasing to police or to the accused party. Moreover, when the DNA database is formally created and legislation is framed to guide who should have and who should not have a right to access, then the implications in regard to third party access should also be evaluated. Also a possible offence in relation to intimidation of staff, interfering with due process, corruption etc could also be considered for inclusion in the proposed legislation.

6.1.4.3 The NFDPL Governing Regulation

There is as yet no legal basis for the NFDPL and the regulation of its activities. This is another most significant issue which has been found through the case study of the NFDPL and other data collection. In order to justify the activities of the NFDPL and in relation to the possibility of other related legal challenges, at present s 451646 of the Evidence Act 1872 and s 5101647 of the Code of Criminal Procedure 1898 are applied. However, these provisions are not a comprehensive legal basis for this newly emerged technology. There are so many issues which could not be answered by the application of these provisions, such as: what should be the rights of the sample providers; how is informed consent to be obtained; what are the rules regarding the sample collection process and retention period; and who should have right to access DNA database; what are the rules regarding the treatment of a minor’s DNA data; what are the privacy and security policies applying to samples and data; and, most importantly, what are the overall guidelines for how to properly manage

1646 Opinions of Experts: s 45. When the Court has to form an opinion upon a point of foreign law, or of science, or art, or as to identity of handwriting or finger impressions, the opinions upon that point of persons especially skilled in such foreign law, science or art, or in questions as to identity of handwriting or finger impressions are relevant facts. Such persons are called experts, Evidence Act s 45.

1647 Report of Chemical Examiner, serologist, etc: s 510. Any document purporting to be a report under the hand of any Chemical Examiner or Assistant Chemical Examiner to Government or any serologist, handwriting expert, finger print expert or fire-arm expert appointed by the Government, upon any matter or thing duly submitted to him for examination or analysis and report in the course of any proceeding under this Code, may, without calling him as a witness, be used as evidence in any inquiry, trial or other proceeding under this Code: Code of Criminal Procedure s 510.
and run the NFDPL. Another issue is that police investigators have been using DNA tests in order to solve criminal cases since 2006, but until now the plaintiffs have had to depend on ‘the judges’ discretionary power in accepting DNA test in the investigation process as there is no law making the DNA test mandatory for the accused’.  

The above discussion has demonstrated that there is no comprehensive legislation regulating or governing the NFDPL and its operations and its forensic use for the purpose of criminal case investigation in Bangladesh. Therefore, it is urgent that comprehensive legislation be enacted to cover and regulate this new area. In addition, in the absence of specific laws the fruits of DNA technology could not be reached on the broadest possible level of application across the jurisdiction.

Considering the necessity of a comprehensive law on the use of DNA information in the justice delivery system in Bangladesh, a draft DNA Act has been proposed to the government in April 2010 by the MSP-VAW project office and the NFDPL authority. The draft has been prepared by joint initiative of the NFDPL and the MSP-VAW project office. A copy of the draft law has been published in the website of the MSP-VAW Project for general viewing and in order to obtain comments. Accordingly, a national consultation and an inter-ministerial meeting on the draft law have been held. The proposed law covers many areas of this newly emerged technology. If this law can be passed, much uncertainty and many anomalies will be removed. At present, the proposed law is under consideration by the Ministry of Women and Children Affairs and process of enactment. The following discussion will analyse the advantages and disadvantages of the proposed legislation.

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1648 Ghias, above n 1578.
1649 All interview respondents (R 1.2, R 2.7, R 3.14, R 4.19, R 5.24, R 6.29, R 7.34, R 8.38, R 9.42) are agreed on this issue.
1651 R 2.7 (as at September 2010).
(a) Deoxyribonucleic Acid (DNA) Act 2010 (Draft): The Proposed Legislative Framework for the NFDPL

Although the Deoxyribonucleic Acid (DNA) Act 2010 (draft) is not enacted yet, it will be interesting to review and examine its main features. This discussion will also add greater value in relation to the research questions and it may support the arguments of the author.

Objectives: The main objectives of this draft DNA Act are to:

- provide for the DNA analysis of bodily substance or tissue samples;
- provide for the evidentiary value of the DNA analysis report;
- provide for the use of DNA testing to determine parentage, matters related to criminal and civil proceedings and other related matters;
- authorise the collection, storage and removal for DNA analysis of bodily substances obtained from the SOC and from anyone convicted of a designated offence for the purpose of creating a National DNA Database.

(i) Bodily Substance Collection with Written Consent: the draft DNA Act authorises the police to collect a bodily substance or tissue sample with the written consent of the victim of an offence, a suspect, the accused or any other person associated with commission of an offence, in a prescribed form. Written consent to collect a DNA sample is required to be supplied in the presence of both police and a witness.

(ii) Right to Consult a Lawyer: This draft Act also gives the person a right to consult with and have the presence of a lawyer of his or her choice in case of adult or, in the case of minors, the presence of his or her guardian, before consenting to the taking of any bodily substance.

1653 The draft is prepared and available in the Bengali language; this is translated into English by the Author. All the provisions referred, described and analysed in English here are taken from Bengali text [Trans of: DNA Act 2010 (draft) preamble.
1654 Draft DNA Act ss 54.
1656 Draft DNA Act ss 4, 7.
1657 Draft DNA Act s 9.
1658 Draft DNA Act s 4, 13.
(iii) Right to Know about the Use of Bodily Substance: Before collecting a bodily substance from a person detained for, or arrested or charged with an offence, a police officer will be required to inform the person that such sample might be used as evidence in a case investigation process or prosecution.\(^{1660}\)

(iv) Right to Refuse to Give Bodily Substance: \(^{1661}\) A police officer cannot use force to collect a bodily substance from a suspect, victim or arrested or convicted person; however, a police officer may use reasonable force to prevent a person from destroying or contaminating any evidence.\(^{1662}\)

(v) Power of the Court Regarding Collection of a Bodily Substance: In cases where a person refuses to give consent for the collection of a bodily sample, a court may, on application, grant an order directing that a bodily sample shall be taken without consent.\(^{1663}\) Before granting such order, there should be reasonable ground for the court to believe that the person against whom the order is sought is associated with commission of, or has committed, an offence, and such collection is likely to prove or disprove a person’s involvement in a crime.\(^{1664}\) If any person refuses to give his or her bodily sample declining court order, the court may issue a warrant for their arrest and detention until the sample is taken from them in accordance with the order.\(^{1665}\)

(vi) Establishment of National DNA Database: The proposed Act also provides provision for establishment of the ‘National DNA Database’.\(^{1666}\) The DNA profiles added into the database can only be used for law enforcement purposes. Such database will consist of a ‘crime scene index’\(^{1667}\) and a ‘convicted offender index’.\(^{1668}\) The envisaged DNA database will assist the law enforcement agencies in solving crimes by:

- Linking crimes together where there is no suspect found;
- Helping to identify suspects;

\(^{1660}\) Draft DNA Act s 10.
\(^{1661}\) Draft DNA Act s 8.
\(^{1662}\) Draft DNA Act s 6.
\(^{1663}\) Draft DNA Act ss 12, 15.
\(^{1664}\) Draft DNA Act s 14.
\(^{1665}\) Draft DNA Act s 16.
\(^{1666}\) Draft DNA Act s 38.
\(^{1667}\) Draft DNA Act s 41.
\(^{1668}\) Draft DNA Act s 42.
• Eliminating suspects where there is no match between crime scene DNA and DNA Profile in the National DNA database; and

• Determining whether a serial offender is involved.

• The proposed DNA database will be, therefore, a most useful revolutionary tool for assisting the justice system of Bangladesh. The proposed Act also provides procedures for taking bodily substance or tissue sample both inside and outside the NFDPL laboratory.¹⁶⁶⁹

(b) Evaluation

Both the highly significant ‘right to consultation’ and ‘right to informed consent’ could be addressed in legislative provisions to protect the human rights and privacy of sample providers. As victims or suspects have the right to consult before giving their bodily substances, this will provide them with an opportunity to know and decide whether they want to give their bodily substance or not. This provision will cover all the required features of the principle of informed consent. Another important point that should be noted here is that the lawyer or consultant concerned should have a clear idea about DNA technology, its potential area of uses and misuses. It means that they must have some scientific knowledge and background about DNA in addition to legal knowledge. Only then would the respective consultant or lawyer be able to give appropriate advice to their clients. However, the proposed Act remains silent on this point (that is, on the qualification of the lawyer or other consultant of the victims or suspects). The proposed s 10 on the right to know about the use of a person’s bodily substance also protects the right of sample providers. This type of right will keep the party concerned aware and, in that way, they would be able to take appropriate decisions about their sensitive personal data such as that of their DNA.

Moreover this draft Act also allows the requested person’s right to refuse to give his or her bodily substance (s 8). Since there is a right to refuse, the suspects ostensibly cannot be forced to do a DNA test, and it could be argued that the law enforcement agencies cannot use force against a person while collecting DNA samples; however, when collection of bodily samples is crucial, and the victim or suspects refuse to give

¹⁶⁶⁹ Draft DNA Act s 5.
their consent, a case sample can be obtained with a court order. As a result, the court would play a supervisory role. This could be important, for example, in two scenarios in relation to DNA sample collection. First, police may have to obtain a court order in order to obtain DNA samples from a reluctant suspect. Secondly, in instances where a victim may be reluctant to supply samples due to intimidation by other parties, again a court order would ensure such collection. Collection would be in accordance with the law. A court order would also ensure collection by an officer, who might otherwise succumb to bribery or intimidation. This provision is very significant because it will minimise misuse due to corruption, bribery, political manipulation, and unnecessarily forceful collection of DNA data by police exercising their power, or collection in the absence of a court order. Without that provision, the proposed Act could be misused.

The ‘right to refuse’ is a basic right of sample providers, but for the interest of public and the national security, some sample collection without consent is indispensable. The Court’s involvement through this provision creates a good balance in situations where sample providers are refusing to give samples, without causing any harm to, or misuse of, their samples and their rights. That’s why the supervisory role and power of the court is required here. Otherwise the fruit of the technology could not be realised.

From the language of the Draft DNA Act, it seems both crime scene profiles as well convicted offender profiles will be allowed to be retained in the proposed DNA database. Under this draft Act, DNA samples could not be retained, though the language of this draft law is not very clear on this issue. Moreover it has not provided any guideline as to what would happen to the 5702 DNA samples from various sources (for example, innocent people, children, suspects) that have been stored (until November) in the NFDPL, a practice that continues. The proposed law has also failed to provide any guidelines as to how long DNA profiles should be retained and what should be the security mechanism (both physical and IT-related) to protect the sensitive information that is contained on this database. Moreover, there is one

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1670 Draft DNA Act ss 12, 15.
1671 For further detail, see Multi-Sectoral Programme on Violence Against Women, NFDPL, above n 1551.
inconsistent provision in the draft Act. In s 29 it provides that after the release of the accused or after the final decision (including appeal, revision and review) by the superior court, all the information related to the accused person’s DNA analysis has to be removed from the database. Yet s 41 provides that profiles (which can contain material of both innocent and convicted parties) obtained from the crime scene can be retained in the crime scene index in the proposed national DNA database.

Convicted offender profiles and SOC profiles could be retained under this draft Act. In addition, other information that is related to convicted offender profiles as well as SOC profiles, such as, investigation related information which are connected to the bodily substance or DNA sample (from which the profile has been constructed), details about the crime concerned, photo ID and fingerprint of that person would be retained in the database (s 43). Such other information could possibly be misused, since some of these may carry sensitive data.

The draft law seems a comprehensive one with all its proposed features; however, there are some important issues which are not addressed. These include the need for a clear distinction between DNA samples and profiles, manner of treatment of these two types of DNA data, and their storage period, particularly the retention period for DNA profiles, rules regarding the treatment of a minor’s DNA data, and, if people give their DNA samples, whether permission is required to be sought from them in regard to the subsequent use of their DNA data. The provisions regarding the privacy and security of DNA data are incomprehensive and vague. Finally, it is also uncertain whether all the proposed provisions will be approved by government without any modifications or amendments at the time of enactment.

Undoubtedly this draft DNA Act is an important mechanism for the DNA lab or database of a developing country like Bangladesh. It is very important to enact this proposed law; otherwise the entire DNA laboratory system, as well as the establishment of a national DNA database, will face uncertainty. Moreover, since the nature of crime is changing rapidly, especially in regards to international terrorism and organised crimes, it is highly necessary to build a comprehensive national DNA
database and enact comprehensive legislation regulating the entire forensic DNA system.

The above discussion has provided a general picture of the current scenario of the NFDPL, including its legislative and administrative mechanisms. It is important to mention here that the case study, reports and other materials about the NFDPL have actually assisted in determining such a picture. However, the case study and some archival materials were not sufficient to prove the hypothesis and answer research questions (that is, to reveal the human rights and privacy issues, as well as gap between UK and Bangladeshi DNA facilities in their respective justice systems). In order to fill this gap, both qualitative (semi-structured interview) and quantitative data (survey) methods were applied. Analyses of both quantitative and qualitative data have provided a clear picture and helped the author to draw the conclusion by answering these research questions. In the next section, the author shall embark on analysing the challenges of the DNA laboratory in the Bangladeshi context based on both qualitative and quantitative data.

6.1.5 ANALYSIS OF COLLECTED DATA: RISKS OR CHALLENGES ASSOCIATED WITH THE NFDPL

Chapter 4 describes the strategy taken for data collection and analysis. The following section is going to present the results of this analysis. First, qualitative data were analysed applying a ‘constant comparative method’. In this analysis process linkages were created among collected data to develop core concept. Thirteen different categories have been identified after coding and analysing the responses. Some issues of this part of discussion have also been argued with the support of quantitative data. The reason for the application constant comparative method as well as mixed methods has been thoroughly discussed in Chapter 1 and Chapter 4 of this study.

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1672 For further details, see Appendix B.
1673 See sections 1.1.6 of Chapter 1.
1674 See sections 4.1.2.1 (b) and 4.1.3.4 of Chapter 4.
6.1.5.1 Data Interpretation and Bringing it All Together: Core Categories

In the constant comparative analysis method of grounded theory, the ‘core category’ is allowed to emerge from the data. In this study, almost every piece of data is connected to the core category and consequently, two main core categories — ‘human rights and privacy issues’ and ‘some gap between UK and Bangladesh in using DNA data for case investigation purposes’ — were allowed to emerge from the interview data. Codes and categories were examined and re-examined, and the author identified that there are some types of ‘human rights and privacy violations’ as well as a ‘gap between UK and Bangladeshi DNA facilities’. These two core categories are also supported by the analysis results of quantitative data. The following sub-sections provide a presentation about and brief discussion of these key ideas and findings:

6.1.5.2 Human Rights and Privacy Violations

Analysis of the interview data has revealed that the overall system is working in such a manner that there is huge scope for human rights and privacy violations. Using the constant comparative method of analysis, the following seven categories (see Figure 13)\(^{1675}\) have been identified. These categories are:

- a) issues with regards to informed consent;
- b) lack of trust and awareness among public;
- c) concerns with regards to involvement, skill and extensive power of police in collection and use of DNA data;
- d) lack of legislation and policies;
- e) societal concerns and stigma;
- f) concerns regarding collection and retention of DNA samples and profiles;
- g) risks associated with equal treatment of adults and children’s DNA data.

All these issues and factors (seven categories), individually and jointly, contribute to, or lead towards, human rights and privacy violations (see Figure 13). One additional category was found in this analysis that is — ‘lab access’ (see and Appendix B) but

\(^{1675}\) See Appendix B.
this was not found to be a potential risk of human rights and privacy violations currently. Therefore, it has been omitted from the main categories list.

After further analysis of these seven categories, the core category or theory — ‘human rights and privacy violations’ — has been developed. Analysis of interview data and the use of the constant comparative method have assisted in the identification of this concept. The Nvivo software version 8.0 has been used to develop this model of ‘human rights and genetic privacy issues’ (see Figure 13). The following sub-sections will discuss these seven categories and also how they are related to each other and contribute to ‘human rights and genetic privacy violations’ (see Figure 13 and Appendix B).

(a) Issues with Regard to Informed Consent
At the time of collecting DNA sample, one of the important requirements is to obtain ‘informed consent’. The NFDPL practice is that once a victim or suspect arrives at the laboratory for DNA testing, the laboratory staff members provide an identification form and obtain the person’s signature on that form. Neither before nor during the collection of DNA sample is there a practice of explaining the collection method. Moreover, the laboratory staff members presume that the victim or suspect has given their consent freely to the police for the whole process. Simply signing the form, however, does not indicate that the sample providers understand what is happening or what the implications are of their signing the consent form. Moreover there is no legislation guiding how to obtain informed consent from the DNA sample providers.

Interview respondents were asked:

Do you obtain informed consent before collecting DNA samples, If yes, what is the procedure (written or oral)? If not, why not?

Regarding informed consent collection, all interview respondents share almost same opinion, although there are little differences of opinions among them on some points. The assumption of prior consent was almost universal. R6 stated that when a matter is referred to the laboratory by the Court or police, the person involved (whether
suspect or victim) arrives at the laboratory with the appropriate court order authorising sample collection. He noted:

We presume that victim or suspect has given his or her consent freely to the police or their lawyer before arriving to the lab.\textsuperscript{1676}

Further explanation is, therefore, deemed superfluous. As R4 said:

When a suspect or victim arrives in the lab to have their DNA test conducted, [as] we presume that they already know everything, … we do not inform them the whole DNA collection, storage, use and its related concerns and benefits.\textsuperscript{1677}

The consent form signed in the laboratory does not appear to prompt further explanation. R7 added:

By filling and signing the form, they provide their consent. We do not ask for their consent, [and] normally we do not explain the whole process of sample collection to them.\textsuperscript{1678}

Finally almost all recounted that, as a part of the collection process, the victim or suspect fills and signs the identification form.\textsuperscript{1679} Some interviewees stated that they explain to the victim or suspect about sample collection process and its subsequent use, but there is no unanimous standard for that. R8 shared that, while collecting DNA sample, an opportunity was given to object to the procedure and its purpose:

[W]e ask the victim or suspect if they have any objection regarding this sample collection procedure and its purpose of collection.\textsuperscript{1680}

R5 further added that:

We also inform [them] that after the DNA sample collected and its analysis will be used in order to prove the allegation against him or her. A link will be established with the crime and it might prove [the person] guilty or innocent.\textsuperscript{1681}

A survey has also been conducted with similar nine participants (see Table 4) and 33.33 per cent of respondents think that they explain and inform the sample

\textsuperscript{1676} R 6.27.
\textsuperscript{1677} R 4.17.
\textsuperscript{1678} R 7.31.
\textsuperscript{1680} R 8.35.
\textsuperscript{1681} R 5.22.
providers about the consent collection procedure, while, 66.67 per cent responded that they only obtain signature in a form and presume that victim or suspects are adequately informed. It can, therefore, be argued that there are some anomalies or problems with informed consent in the collection process.

**Table 4: Frequency Distribution about the Method of Obtaining Informed Consent**

<table>
<thead>
<tr>
<th>Method of Obtaining Informed Consent</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explaining the whole process to sample providers</td>
<td>3</td>
<td>33.33</td>
</tr>
<tr>
<td>Obtaining signature in a form and presuming that victims/suspects are adequately informed about the whole process</td>
<td>6</td>
<td>66.67</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Based on the collected data, it can also be argued that informed consent for the collection process in the NFDPL is neither uniform nor consistent. Moreover, the collection method is inadequate; therefore, it can be argued that participants are not informed in any real sense. In general, sample providers (that is, the mass of the people) are not conscious about the value of proper use of their right to informed consent. In addition, as the current system does not allow the person the right to consult with their chosen lawyer or other party before giving their sample, the whole process is in fact poses a risk to human rights and privacy violation.

**b) Lack of Trust and Awareness**

There is lack of awareness among general public. Almost 90 per cent of people in Bangladesh are not aware of the recently developed DNA technology and they do not have a proper knowledge of what DNA or DNA testing is, or how it works. Even members of law enforcement agencies, lawyers and magistrates have little knowledge about DNA profiling and its use. Moreover, judges were conservative in accepting DNA evidence presented before their court. Experts claim that for the DNA laboratory to be properly utilised, there has to be far greater awareness about DNA profiling itself and of the potential it holds. Moreover, there is some doubt about the technology among the general public. At the very beginning, even the legal experts and law enforcement agencies had no clue whatsoever about DNA testing
and analysis and were very sceptical. In relation to public understanding and sentiments, R1 stated:

The first challenge is public feelings and opinion about this new technology, for instance the general public is suspicious about the quality of DNA testing. There is also much corruption in Bangladesh, consequently, the general public have a lack of trust in the state bodies involved with the new technology.1682

Ignorance or a lack of knowledge of among ordinary people who find themselves involved in cases (for example, innocents, victims, suspects) and service providers (for example, police, judges, lawyers, magistrates) could pose a risk in terms of violations of human rights, including the right to privacy. Ignorance threatens the integrity of the justice system as a whole by unequal access by victims to the service provided by this laboratory. Due to their lack of awareness or ignorance, many poor victims would not even know about the government funds that are available for conducting their DNA testing. R2 shared his view in this regard, ‘[t]here is a government fund for the poor victim. But most of the ordinary people do not know about the fund’.1683 Some other respondents supported the view of R2, stating that most of the poor victims even do not know how to access these funds.1684 Thus the human right to equality before the law is stymied, as access to needed laboratory services is denied.

(c) Concerns with Regards to Involvement, Skill and Extensive Power of Police in Collection and Use of DNA Data

Under the current Bangladeshi legal system and the practice of the NFDPL, the victims or suspects are identified by police. Personal information of sample providers (for example, name, parents name, address, age, gender, and case details) is also obtained along with their bodily substances as a part of this process. Samples or bodily substances are also collected by police from crime scenes. In the whole process no personnel are involved apart from those of law enforcement agencies. As a result, the potential risk is that the preliminary identification of victim and or suspect, and/or collection of tissue samples are conducted mostly by a generally unskilled police force. The use of DNA testing and profiles being a recent innovation

1682 R 1.4.  
1683 R 2.9.  
1684 R 4.20, R 5.25, R 6.30.
in Bangladesh, so law enforcement personnel lack adequate knowledge about not only the technology but also the processes involved, including DNA collection (for example, how to obtain DNA sample without degradation, how to maintain privacy, and also to protect the sensitive personal data like DNA).

Most police are not aware about the potential and sensitivity of DNA data. There is possibility of contamination while collecting DNA sample and also violations of privacy. Moreover, the police of Bangladesh are often subject to political influence,\textsuperscript{1685} and there is also scope for exercising various corrupt practices, such as bribery.\textsuperscript{1686} As a result, while collecting and using DNA data there is a high possibility of corrupt practices or political manipulation occurring. It could also be argued that identification of victims or suspects, and/or collection of samples from crime scene is the most important stage. If it is not done properly, and there remain mistakes or misuse, the fate of a particular case is at risk, and the parties involved will not obtain justice.

In this regard, the constant comparative method of analysis has developed the following category: ‘concerns with regards to involvement, skill and extensive power of police in collection and use of DNA data’. The Nvivo model has illustrated the analysis of results in Figure 12. There is a link between and among each category and concept. Each and every category, individually and jointly, highlight the various ways in which law enforcement agencies are involved in this process. It should be noted that such involvement makes them extremely powerful in dealing with sensitive DNA data, both in terms of sample collection and in terms of subsequent access to profiles. Extensive powers for police increases the likelihood of the misusing DNA data. In regard to sample collection, DNA can be intentionally


contaminated, even substituted, rendering the whole subsequent analysis process misleading, perhaps even result in a false conviction or exoneration. In regard to database access, manipulation and substitution or deletion (data loss) at this highly technological level is only possible among more highly educated individuals; but access to information could facilitate other forms of corruption (bribery, extortion). As can be seen, police integrity is essential to the maximisation of the potential of DNA in the service of justice. Individual and family privacy are in danger and it can therefore be detrimental in terms of human rights and privacy violations.

Figure 12: Nvivo Model Developed Based on Some Interview Responses

(d) Lack of Legislation and Policies
Another main challenge is that the legislative framework for the management and use of the NFDPL is still in its infancy. There is no legislation regarding the use of DNA technology, nor in relation to the admissibility of DNA evidence in court. The interpretation of some existing legislation (that is, s 45 of the Evidence Act 1872) allows the courts to entertain new scientific evidence, but many experts feel that a comprehensive law should be enacted to cover uses of DNA and all issues related to it. In this regards, the views of R1 and R2 can be referred to, ‘[a]t present DNA tests

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1687 For further details see Appendix B.
are accepted in court as “scientific evidence” under the Evidence Act of 1872 but ‘the court cannot force any person to do the test because of a lack of legal basis’.

In the current state of legal ambiguity, the legitimacy, authenticity and admissibility of DNA evidence in Bangladeshi courts can be easily challenged, even though it is accepted in courts of law across the world. Moreover, in most cases due to the lack of legislation, police cannot produce suspects at the laboratory because they refuse to participate in DNA testing. Without the test, it is difficult to reach any conclusion and, finally, victims do not get justice. This is a very frustrating situation. Similarly, rape cases are hard to solve as suspects mostly do not agree to do DNA tests. Often rape cases are unsuccessful. Supreme Court lawyer Khan Saifur Rahman said:

If a suspect refuses to do DNA test then there is nothing court can do. Therefore, new laws are needed to force suspects to do the test.

In this regard, the case of seven children of the former deputy inspector general of police, Anisur Rahman, can be cited. Initially this case remained unsolved for some time after the DIG refused to do a DNA test to prove his paternity. Lack of legislation and policy for this area is causing many uncertainties with regards to the functioning of the DNA laboratory and its use for the delivery of justice. Considering the significance of the need for appropriate legislation, NFDPL staff and MSP-VAW project officers have prepared a draft DNA Act and currently draft DNA Act is in the process of enactment (as discussed earlier). The government appears a little reluctant; therefore, the proposed law is taking longer time than expected to be enacted, and situation remains hap-hazard until it comes into force.

In addition, there is also no privacy policy in place to protect sensitive DNA data. The replies of most of the interviewees have indicated that a lack of legislation and privacy policy are widening the path to violations of individual and family
privacy. The following survey results support interview responses. That means 100 per cent respondents unanimously highlighted the similar fact:

<table>
<thead>
<tr>
<th>Opinion about privacy policy</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>100.00</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>100.00</td>
</tr>
</tbody>
</table>

On the other hand, one respondent believed that laboratory data are protected, even though there is no privacy policy, because according to their laboratory practice, DNA data are not shared with third parties, except the requesting body.1694 A view of R5 is rather contradictory of other respondents. R5 stated:

"[I]n our laboratory system there is no scope for violation of privacy. ... If any case arrives related to family or friends, then somebody from that family or friend wants to know about DNA test results, because of proximity of relationship we normally inform them about the test result. Though we do not tell them who [that is which scientific officer] is handling the case in the laboratory." 1695

The above interviewee clearly believes that this is not a violation of privacy, nor that the privacy of DNA data are un-protected. No legislation exists currently that covers this situation. Yet, in reality, this kind of sharing with parties other than the sample providers (or without the sample provider’s consent) could be termed as violation of privacy. The lack of both legislation and privacy policy issues are interconnected. Without a privacy policy or legislation containing provision/s protecting privacy of laboratory data, the practice of privacy protection is not universally applied. This is harmful for sensitive data like DNA which are stored on the NFDPL.

(e) Societal Concerns and Stigma
In the existing justice delivery system of Bangladesh and the practice of the NFDPL, all cases for DNA testing must go through the court or the law enforcement agencies

1694 R 5.24.
1695 R 5.24.
(that is the police). There is no scope for entertaining private requests or cases. This practice is meant to limit the misuses of DNA test. According to the view of R1:

If we are allowed to entertain private cases, it might corrupt the whole system, and there will be no transparency as well as a lack of checks and balances.1696

R2 further added that:

Such practice allows us to maintain good checks and balances in our system. Besides, if there were an undue number of cases, it would be difficult for us to handle and provide accurate DNA results.1697

On the other hand, the concerns is that in many circumstances, the parties do not want to disclose their personal matters before public entities or bodies, and if they are forced to go through that prescribed methods (police or courts) then there is no room for privacy. Therefore, it can be argued that without the scope for private cases, lots of cases could not see the light of day (or justice). This is because many innocent people from respectable families do not want their private family matters to be disclosed before the society. It is seen as threatening their right to privacy. Moreover, it raises main societal concerns, such as, if police and court are involved in any case, a stigma will be associated with that person and his or her family. If the matter, ultimately, is seen as affecting the reputation of a family not just the individual involved, a complaint and thus a case may not be brought. A noted example in this regard is the instance of rape. Being a rape victim causes stigmatisation of the girl (clearly undeserved) and is also seen as affecting family reputation.

(f) Concerns regarding Collection and Retention of DNA Samples and Profiles
It has already been identified and highlighted that the NFDPL does not have any uniform set of data retention rules or policies. Interviewees have differences of opinions regarding policy in relation to DNA sample and profile retention.1698

1696 R 1.3.
1697 R 2.8.
1698 For further details see section 6.1.4.2 (b) of this Chapter.
Figure 13: Nvivo Model for Human Rights and Privacy Violations
The survey results also reflect that the existence of some anomalies with regards to the DNA data retention period in the NFDPL. The majority of interviewees and a majority of survey respondents (55.56 per cent) believed that DNA samples are retained for from one to two years in the NFDPL. All of them, however, agreed that DNA profiles are retained indefinitely. Although this is the established practice of the NFDPL, a data retention policy or rule, containing a direction in regard to how long a DNA sample should be retained or when it could be destroyed, is essential for this laboratory. Moreover, the NFDPL lacks security standards and has no policy in relation to computer data safety. It also lacks appropriately trained IT security personnel. Yet in the absence of proper security measures, the laboratory retains sensitive DNA data. R5’s experience reflected a scenario where there is a partial adoption of IT security:

In order to encounter logical [IT] threat, we use antiviral software and our computers are password protected. Other than scientific officers, nobody is allowed to use these computers. But sometime we share our computer and data with each other (between and among scientific officers only) even though it is password protected.1699

The security system is not sufficiently standardised to protect sensitive data, like DNA samples and profiles. There is a practice of sharing data among scientific officers and, therefore, password protection is meaningless. It cannot be identified as secure system.

**(g) Risk with Equal Treatment of Adults and Children’s DNA Data**

The NFDPL receives samples from children (that is, those below 18 years of age). In cases of paternity testing, samples are even collected from the body of a newborn. In rape and murder cases, the laboratory also gets samples from the juvenile offenders (14–16 year olds).1700 There are regular cases for DNA testing and profiling of innocent child as well as child offenders, although the number is very low compared to the number of adult profiles. In this regard R8 provided his opinion that:

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1699 R 5.23.
1700 R 3.13, R 5.23.
There is no accurate data on the number of cases related to juvenile offenders but, on an average about 25–30% of the cases sent to our lab for DNA profiling are of the juvenile offenders.\textsuperscript{1701}

After resolving the case, the DNA sample of juvenile offenders are stored and retained just as are the samples of adult offenders. Children should not be compared to habitual offenders, or those convicted of serious crimes, so neither should their samples and profiles be accorded the same treatment as that of such offenders. It increases the likelihood of violations of the human rights and privacy, and, in this instance, child rights. It could even jeopardise the bright future of a child, should sensitive data be shared with relatives or others.

After analysing data gathered from interviewees, survey results and other materials, it can be argued that although many administrative, technical and legislative measures have already taken to improve the NFDPL facilities for the Bangladeshi justice delivery system, there still remain some problems in the whole system. The seven above mentioned categories are some significant ones which have been identified by this study. It further can be argued that all these issues are inter-connected. One problem contributes to another. For instance, if informed consent is not properly obtained, the contributing factors are is lack of awareness and lack of legislation. In other words, there is no stringent rule for collection of informed consent. Other issues — concerns with regards to power of police, concerns regarding collection and retention of DNA samples and profiles, risks posed by equal treatment of both adults and children’s DNA data — also exist because of a lack of legislation and policies.

Again, because of lack of awareness people are not concerned about the consequences of insecure retention of their DNA data, the value of their informed consent, or the possible misuse of children’s DNA data if it treated equally with adults DNA profiles. Since there are no legal or policy mechanisms, then people are not sufficiently aware of their rights, and so the police force then has greater opportunity to manipulate the system. Because of lack of awareness and knowledge, the parties involved are not putting pressure on the government for comprehensive

\textsuperscript{1701} R 8.37.
legislation. Moreover, as there are no legal guidelines, the laboratory does not have any consistent DNA sample and profile retention periods. All these issues are individually and jointly contributing to the violation of human rights and privacy. The seven categories identified through the use of the constant comparative method of analysis concentrate towards the main problem or core category, namely ‘violations of human rights and privacy’. The Nvivo model for human rights and privacy violations (see Figure 13) is a good example of interconnectedness among these issues. Though the case like Marper has not been prosecuted yet in the Bangladeshi jurisdiction, if the system continues as it is there is a distinct probability that cases similar to the Marper case and its judgment will emerge in near future.

6.1.5.3 Gap between Developed and Developing Countries

The constant comparative method of analysis has also identified another six categories and these new six categories refers to financial, technical and administrative challenges (including some social and cultural issues) faced by the NFDPL. This challenge actually refers to gaps between developed and developing countries. These six categories have developed and are concentrated towards the core problem or category: ‘gap between developed and developing countries’. As has already been discussed, the Nvivo model for ‘gap between developed-developing countries’ (Figure 15) has been developed by applying the constant comparative method. All these issues are actually repetitive responses from all interviewees which has been coded applying Nvivo 8 software. This model refers to the practical situation of the NFDPL. These challenges which are identified by the qualitative data analysis are discussed below (Figure 151702):

(a) Job Discrimination and Uncertainties

Among the concerns raised by the employees at the NFDPL was the issue of discrimination between and among the NFDPL staff in terms of employment and job security. Some of the staff are appointed directly under the MSP-VAW project and they are paid according to the project document. Other staff of this laboratory are appointed by a third party vendor organisation and their terms and conditions, and

\[1702\] See also Appendix B.
payments are regulated by this third party organisation. Although they are working under the project, nevertheless, their employment is not secured under the project. The issue of job discrimination has been identified by some of the interview respondents. R7 and R9 respectively argued that ‘there are lots of problems... we have salary and job discrimination’ and ‘we do not have any job security’. R8 added that:

> [I]nitially, we were appointed under the MSP-VAW project but now our status has been changed. At present, we are appointed under a different company. Under the current recruitment rule, we do not have any pay scale, nor is our salary regularly paid or bonuses allocated.

Some of them have complained that:

> We do not have any clear and set organisational hierarchy [in the lab]. Moreover we have not got any promotion since our appointment. Some of us have already left this job and have joined another organisation.

The following quantitative data also support the findings of the qualitative data (that is, the interview responses):

<table>
<thead>
<tr>
<th>Concerns about employment status</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>7</td>
<td>77.78</td>
</tr>
<tr>
<td>Agree</td>
<td>0</td>
<td>00.00</td>
</tr>
<tr>
<td>Neutral</td>
<td>0</td>
<td>00.00</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>22.22</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>100.00</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>100.00</td>
</tr>
</tbody>
</table>

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1703 While some of the staff members are appointed directly by the MSP-VAW project under its own payroll, some other positions are outsourced. Outsourced positions are filled with individuals recruited by a service provider agent (that means third party vendor companies) according to their terms and conditions. Although these posts are stationed at the MSP-VAW project office and work fulltime under direct supervision of the project authority, technically, however, they are not project staff. They signed contract with the service provider agent and even paid by them once the agent received payment from project and deducted its commission.

1704 R 7.34.

1705 R 9.42.

1706 R 8.38.

Such discrimination is causing dissatisfaction and uncertainty in their minds. It may threaten the retention of skilled personnel. In addition, to ensure uninterrupted service on the part of all laboratory staff, their jobs need to be brought under a single governmental revenue budget. This will integrate them into the public service; otherwise a lack of job security might possibly force them to seek jobs elsewhere, resulting in a loss of skilled labour, which could impact on the services provided.

(b) Lack of Knowledge and Co-operation and Co-ordination

As DNA analysis and profiling is a new technology for Bangladesh, judges, lawyers and magistrates are not familiar with it. Moreover, some judges are conservative and somewhat reluctant to accept this new technology. In this regard, R2 argued that:

Lack of cooperation and co-ordination on the part of the service providers (police, courts and lawyers) is one of the biggest challenges. The success of DNA testing and the lab depend on the co-operation of the police, the court and the lawyers. If judges are positive about this new technology, then the success rate would be very high. They can even motivate ordinary people, because ordinary people have a huge faith in the judiciary. But if the sitting judge thinks that he will not consider the evidence, then it is useless. Besides, disputing parties and their lawyers need to feel that DNA testing is necessary to obtain justice, and they then need to convince the court and seek permission for the DNA test in the particular case. If lawyers are reluctant because they do not understand this new technology, then the whole purpose will be frustrated.1708

In addition police, judges, lawyers and magistrates ‘do not have any scientific background’.1709 Many of them have no expertise or proper knowledge of DNA technology and its use in the justice delivery system of Bangladesh. Often a scientific officer of the NFDPL has to go to the court to interpret the test results. There is no suitably qualified legal expert to verify the authenticity of such test results or DNA data. The interviewees, however, noted that there is now provision for regular training for service providers, such as judges, lawyers, police, magistrates, and forensic doctors.1710 How extensively that training is conducted across Bangladesh has not been determined.1711

1708 R.2.9.
1709 R 2.9.
1710 R 2.9, R 3.13, R 5.25.
1711 If the training of laboratory staff themselves is to be an indicator, training of others could be somewhat lacking in frequency, see R 7.32.
(c) Shortage of Technical Hands

The number of scientific officers and laboratory technicians currently employed at the NFDPL is very low and they are always overloaded with their work. Such a small number is not sufficient to serve the needs of the population of Bangladesh. Further, this inadequate number of staff would not be able to provide quality service, especially in cases of great urgency. In addition, although the laboratory is assisting the law enforcement agencies, it is not staffed to meet the growing demands of the police investigators.1712

The NFDPL’s lack of skilled technicians and the laboratory has prompted hiring expertise from abroad (generally India) to train local staff. R3 states that:

When new technology or methods arrive, there is an arrangement with an Indian lab for providing training — we hire a technician from that lab, he installs the technology and trains the lab scientific officers and lab technicians. … There is a lack of technician equal to his standard in Bangladesh.1713

Again this highlights the lack of sufficiently trained personnel in adequate numbers to cope with the increasing demands of the new technology and a forensic workload that can be anticipated to continue to increase. It should perhaps be noted that the presence of highly trained, well paid personnel reduces the risk of corruption in any workplace and therefore helps assure data integrity in an institution such as the NFDPL.

(d) Lack of Development Co-operation

At present other than Danida funding, there is no collaboration and cooperation of the NFDPL with other international bodies or DNA laboratory or databases of other countries. Not only does the NFDPL have rely on hiring foreign technician for training purposes as technology changes, it has been noted that the laboratory does not reach in that standard where it could share data for detecting some international terrorists. Again, R3 opines that:

[E]conomic and technological shortcomings are the main challenges on the path to the future sustainability of the NFDPL. I believe this is one of the main gaps between developed and developing countries.1714

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1712 Raza, above n 1492.
1713 R 3.12.
1714 R 3.15.
In order to develop the laboratory to an international standard, more development cooperation with the outside world is required. Access to technical and financial training or sharing of knowledge is really important in this regard.

(e) Other Challenges

There are some other challenges, such as, the very high operating and maintenance costs of the NFDPL, in a context where Danida funding will expire in June 2016. Its operating cost runs to around BDT (Bangladesh Taka) 1 crore (which is equivalent to USD 1 29 870 (approx)) per year. In terms of capital costs, a DNA analyser (which is the main appliance of a DNA laboratory) cost BDT 1.5 crore (which is equivalent to USD 1 94 805 (approx)) to purchase initially, apart from the cost of computers and other equipment.\footnote{Ghias, above n 1578.} For a developing country like Bangladesh, acquiring and then maintaining such a laboratory with its costly technology is a big challenge.

Moreover, DNA tests are very expensive for the general public. Either the defendant or the plaintiff has to pay the charge. If they are unable to pay, the charge has to be borne by the police but in many cases police do not have enough funds to pay these costs. All respondents identified following segments where laboratory is facing challenges or supports need to be increased (see Table 7).

<table>
<thead>
<tr>
<th>In order of priority</th>
<th>Segment where support needs to be increased from all sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Financial and logistics support</td>
</tr>
<tr>
<td>2</td>
<td>Training</td>
</tr>
<tr>
<td>3</td>
<td>Back up facilities are poor (both IT and physical)</td>
</tr>
<tr>
<td>4</td>
<td>Lack of public awareness and information; lack of knowledge; lack of dissemination information in electronic media</td>
</tr>
<tr>
<td>5</td>
<td>Expensive or costly test</td>
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</tbody>
</table>
In addition, some other challenges include that the laboratory has only small space and there is not an adequate back up facility. There is also no scope for regular training for the laboratory staff. R7 notes, ‘[a]fter joining this lab, I once got some training. I have not got any further training’. 1716

(f) Question of Sustainability: Future of the NFDPL

At present, although its operating costs are very high, the NFDPL services are contributing positively to the justice delivery system of Bangladesh. According to the view of some respondents, in order to investigate crime, there is no better technology in Bangladesh than DNA profiling. The general populace are obtaining better justice. This is more important when comparing such progress to the high cost of DNA testing. People also consider that they are getting correct judgments. 1717

The laboratory has the potential to contribute to the justice delivery system of Bangladesh, if some associated challenges with its future sustainability can be removed. For instance, after running out of funding from Danida, performance and achievements of NFDPL will depend mostly on whether the government will take up the responsibility for funding and maintaining the laboratory. The laboratory is currently running under a project and so is not even in the revenue budget. Uncertainty also looms as to whether this highly sophisticated technology can be brought to the masses in a country where basic forensic services like viscera reports take months to deliver. Shahdeen Malik, Advocate of the Supreme Court highlighted that:

We are yet to implement basic forensic technologies like collecting fingerprints in the investigation process at the mass level. At this stage it is hard to say how far this highly sophisticated DNA technology can be brought to the mass people. 1718

Future or sustainability of this laboratory depends on many issues at this stage (see Figure 15). 1719 The laboratory has proven to be a reliable investigative tool, and there are also funds for poor victims. Public reliance on the technology is increasing day

1716 R 7.32.
1717 R 4.20, R 5.25, R 6.30.
1718 Monishita, above n 1567.
1719 For further details, see Figure 15 of the Nvivo Model for ‘Gap between Developed-Developing Countries’.
by day. The state and the public should realise the importance of the laboratory in trying to achieve justice and accurately identifying individuals.

The above discussion has highlighted that there are some challenging areas where financial, technological and administrative support is essential for this laboratory. If national and international assistance or development cooperation are not provided, it will certainly adversely affect the future sustainability of this laboratory. Three categories — ‘lack of development cooperation’, ‘other challenges’ and ‘question of sustainability: future of the NFDPL’ — are interconnected. It can therefore be argued that financially and technologically Bangladeshi laboratory is far behind compare to the NDNAD of the UK and there are some gaps between NFDPL of Bangladesh and NDNAD of the UK.

![Nvivo Model about Future of NFDPL](image)

Future or sustainability of this laboratory depends on many issues at this stage, such as, the effective role of judges and the existence of appropriate back-up facilities. Issues of its sustainability and longer term prospects have been illustrated in Figure 14.\(^{1720}\) The laboratory has proven to be a reliable investigative tool, and there are also funds for poor victims. Public reliance on the technology is increasing day by day.

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\(^{1720}\) For further details, see also Figure 4 of the Nvivo Model for ‘Gap between Developed-Developing Countries’.

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The state and the public should realise the importance of the laboratory in trying to achieve justice and accurately identifying individuals.

The above discussion has highlighted that there are some challenging areas where financial, technological and administrative support is essential for this laboratory. If national and international assistance or development cooperation are not provided, it will certainly affect the future sustainability of this laboratory. Three categories — ‘lack of development cooperation’, ‘other challenges’ and ‘question of sustainability: future of the NFDPL’ — are interconnected. It can therefore be argued that financially and technologically Bangladeshi laboratory is far behind compare to the NDNAD of the UK and there are some gaps between NFDPL of Bangladesh and NDNAD of the UK.
Figure 15: Nvivo Model for Gap between Developed-Developing Countries
DNA technology contributes significantly in proving a suspect guilty or not beyond all reasonable doubt on the balance of probability, by convincingly linking a suspect with a victim or SOC, it contributes significantly to the cause of justice. It brings comprehensiveness to trial proceedings and investigations, but also can enforce greater accountability of the experts, but strict penalties against tampering with evidence must be maintained as this is the key to the integrity of the entire process.

This Chapter has examined the case study on the NFDPL of Bangladesh and its related qualitative data (interview responses) and quantitative data (survey results). The discussion of this chapter is dedicated to the analysis of factors in the establishment, gradual development and functioning of the NFDPL. The discussion also includes how DNA samples are collected from various sources, stored and analysed in order to identify victim or suspect, in other words to serve the justice delivery system of Bangladesh. The case study, interview and survey data have also revealed that there are some risks and threats associated with this laboratory and the overall justice delivery system in Bangladesh. Two significant challenges has been identified from constant comparative method of analysis one is ‘human rights and privacy violations’, and the other is the disadvantaged suffered by Bangladesh in maintaining the NFDPL compared to other developed countries database like the NDNAD of the UK, in other words, ‘gap between developed-developing countries’.

These findings have been supported by simple frequency distribution of simple univariate statistical analysis (quantitative data analysis method).

Some human rights and privacy issues include, the process of collecting informed consent for obtaining DNA samples from victims and suspects is not quite ‘free’ nor is it necessarily ‘informed’, with a lack of recourse to advice from reliable third parties. The integrity of law enforcement personnel is crucial. While the very reliability of DNA evidence may assist in encouraging a new police culture by ostensibly taking the matter out of the hands of individual officers, there remains the possibility in the existing culture of political manipulation and corrupt practices for which Bangladesh is notorious, that DNA evidence can be tampered with, including by sample substitution (at point of collection by law enforcement personnel) or loss,
especially where political interests are involved. Where witnesses are also required to ensure a conviction, these can continue to be intimidated or eliminated, undermining the value of the DNA evidence presented. Intimidation of victims of crime either directly or through their families can also result in cases not proceeding despite DNA evidence, as can the elimination of a crime victim where their testimony is required. Staff of laboratories, too, must also be made less vulnerable to corruption and intimidation. This is not to imply that any current staff members are in any way corrupt, but to simply point out the possibility for such corruption at some future date, particularly if the system becomes significantly underfunded and lower paid, less skilled staff are then employed.

Moreover, most ordinary people are not aware of their privacy rights. The biggest problem facing this laboratory is that there is no legislation for guiding and regulating its activities (for example, in relation to sample collection, retention, privacy policy, security mechanisms.). After applying the constant comparative analysis method of GT, some of these aspects of human rights and privacy violations have been detected under existing system of NFDPL. It is also found that there are some interconnections between and among the various issues. All these issues either individually or jointly are contributing to increasing the possibility of human rights and privacy violations.

With regards to financial and technological issues — that is the second research question — it is identified that the NFDPL is operating currently under a project funded by the Danida for a specified period of time. Such funding is for limited time only (until June 2016). Although the time is very limited, the government of Bangladesh has not taken any initiative to place this laboratory within its revenue budget, nor shown any indication or intention of doing so. Uncertainty, therefore, looms large about future sustainability of the laboratory because there are huge administrative and technological costs involved with this laboratory every year. With regards to other issues, it can be shown that laboratory staff members are dissatisfied with their job prospects and, as a result, skilled personnel might leave and the laboratory lose important technical expertise. Further, there is also lack of legal expertise in the interpretation of DNA evidence in the court and clarify it in terms of
evidential value. There is also a lack of knowledge among judges, lawyers and police, as well as a failure to develop international co-operation that would facilitate a better service. This is further complicated by a poor monitoring and oversight system, and a lack of co-operation or co-ordination between service providers (police) and the laboratory. All of these lacunae further weaken the NFDPL operation and services.

Constant comparative analysis has further identified that there is no scope for regular training of laboratory staff and poor back up facilities. These raise the question of the sustainability of the NFDPL. These challenges also have drawn a picture of a gap between developed-developing countries. It is important to remove all financial, technological and human resources gaps in order to prevent or minimise human rights and privacy violations in Bangladesh. Finally another main category: the ‘gap between developed-developing countries’ has been developed through the application of the constant comparative method. The second core concept is illustrated in the Nvivo model 2 (see Figure 15). Such a concept is also supported in many instances by the results of the quantitative data.

It is just five years since the establishment of the NFDPL. At the very beginning, both the users and service providers did not accept the use of DNA technology. In its first year of operation (2006), there were only 28 cases (see Table 2), but up until November 2011, the laboratory has assisted in resolving 1516 cases (consisting of 5702 samples). The technology is slowly gaining recognition and is contributing to various civil and criminal case investigation processes. According to R1:

> The use of DNA profiling is spreading. The progressive-minded legal professionals and law enforcement agencies are willing to explore this field and the unlimited possibilities it holds.\(^{1721}\)

This data analysis identifies some weaknesses regarding the usual practices of the NFDPL; however, there are also some good practices which will help to sustain the laboratory and contribute in the justice delivery system of Bangladesh. In resolving the conflicting pressures of these issues, the collected data helps to reach the expected outcome of this research project.

\(^{1721}\) R 1.5.
If a developing country like Bangladesh, a DNA service system is not to be left behind in this extraordinary period of technological development. It is vital that the laboratory should have the necessary facilities and technical and professional expertise. Because the field is moving so rapidly, even many developed countries have a major shortage of scientists and technicians in this field. Without appropriate personnel and technological supports, it will be impossible for this country to develop and use this technology properly. A start can and should be made in establishing development co-operation (which includes technician development and, technical support) between developed and developing countries so that the DNA technology can be introduced and used equally by all countries. In this regard, the former Director General of WHO, Gro Harlem Brundtland, noted his foreword to the world community:

> [I]nternational partnerships and co-operation strategies [is necessary] to ensure that fruits of the genomic revolution are equitably shared by all. Strong international leadership is required to achieve these laudable aims.1722

Although this remark by the former WHO director general is directed towards the health benefits, this statement is equally true in regard to the field of the forensic use of DNA information. In the same way as genomic revolution poses some social, ethical concerns, so too does the forensic use of DNA, and developing countries need international support and co-operation as well as partnership in this area.

Foundations are also required to be built on which any kind of new technological development in this area can be introduced for the benefit of developing countries. Building foundational relationships between developed and developing countries and building independent institution and enacting relevant legislation are some important steps. At present, the NFDPL should be an independent institution, so that bureaucratic intricacies can be broken down and such institution can be operated as a logistic and technical backup for the people, and for forensic professional, legal experts and law enforcement agencies. In addition, societies need to be better prepared for this new area of case investigation techniques and their related consequences. Public education, understanding and trust are some basic pre-requisite

1722 World Health Organization, above n 1, 2.
on these key issues. In addition, enactment of the proposed DNA Act of 2010 can be a way to ensure the legitimacy and authenticity of DNA technology in the Bangladeshi jurisdiction. Moreover, it can work as good guide for proper investigations (including the collection and use of DNA data) and fair trials. This legislation could also open doors to look for better strategies to ensure human rights, privacy and preventing misuse related to this sensitive data. This is because a legislative approach has some enforcement mechanisms rather than a mere guideline. It will convey a clear message for the DNA data users, law enforcers, forensic experts, judges and lawyers that proper use forensic DNA data will bring fairness and justice for all, at the same time it recognises and imposes severe sanctions in relation to its misuse which could otherwise be seriously detrimental to social harmony, peace and the integrity of the justice delivery system.

The following chapter (Chapter 7) will undertake a comparative analysis of the findings from the case studies of the NFDPL of Bangladesh and the NDNAD of the UK. The comparative analysis will focus on and be confined to the main issues raised and discussed in these two case studies and their related findings. It will particularly compare and contrast these two case studies in terms of their database management practices and regulations, and their impacts on human rights and privacy (including genetic privacy). In an attempt to do this, this chapter will take into consideration the technological, political, economic and cultural differences between these countries. It will conclude by providing some recommendations based on the findings of these case studies.
CHAPTER 7

7.1 COMPARATIVE ANALYSIS AND THE WAY FORWARD

7.1.1 INTRODUCTION

The main aim of this chapter is to demonstrate the core problems of the forensic use of DNA in developed and developing countries, the former represented by the UK, and the latter by Bangladesh. It will mainly compare the issues that have been identified in case studies of the major forensic DNA databases or systems in those countries. Chapter 5 presents the first case study — the forensic use of DNA information in the developed country context, in other words the use of the National DNA Database (hereinafter referred to as the NDNAD) in the UK justice delivery system. In contrast, Chapter 6 highlights the second case study — the use of DNA information in the justice delivery system of a developing country, that is, the use of the National Forensic DNA Profiling Laboratory (hereinafter referred to as the NFDPL) in Bangladesh. Both chapters examined the scope of human rights and privacy violations, and then continued the discussion and analysis to reveal the gaps between these countries in the provision of their forensic DNA services.

There are many similarities and even more differences in regard to the services provided by the NDNAD and the NFDPL. The nature of the challenges faced is similar to some extent; however, some issues where there are differences have also been identified in the last two preceding chapters. Before conducting the comparative analysis of the NDNAD and the NFDPL, it is important to compare the legal-political background and overall human rights situation of the UK and Bangladesh. Although the UK and Bangladesh represent two distinct scenarios in terms of political, legal, economic and social backgrounds, they are similar in many respects. These differences or disparities have a big impact on the basic human rights situations of these countries. The comparative analysis will thus discover how these different social, economic standards are contributing to human rights and privacy (including genetic privacy) violations in respective countries. Therefore, in the first part of this chapter (that is, section 7.1.2) the legal-political and social-economic background of the UK and Bangladesh as derived from the analysis of the case studies will be compared and contrasted.
Subsequently the second part of the discussion (which begins with section 7.1.3) will provide a comparative analysis between the NDNAD and the NFDPL. It will first address the issues concerning human rights and privacy violations, and then identify the gaps between UK and Bangladesh with regards to forensic DNA facilities in their justice systems. Subsequently, section 7.1.4 will conclude by offering some options or recommendations based on the findings from the comparative analysis. Section 7.1.5 — the final part of this chapter — will argue whether there is any avenue and scope for further research in this area, and then section 7.1.6 will provide the concluding remarks for the entire research project.

7.1.2  COMPARATIVE STUDY BETWEEN THE UK AND BANGLADESH

The analysis of the political and legal history of the UK and Bangladesh reveals that both the UK and Bangladesh are based on common law legal systems. Bangladesh was under substantial British influence for two hundred years since 1757 AD. Whilst control by the British East India Company marked the first century, direct British rule extended across much of the Indian sub-continent in the second century, with the Bangladesh of today forming a major part of the Province of Bengal. As a result, particularly of this latter period, the legal systems of the UK and Bangladesh are very similar in many respects.

Despite this similarity, significant differences exist. The UK was an important colonial power whilst Bangladesh was the colony. The following two sub-sections will first outline the experiences of the UK and then those of the Bangladesh.

7.1.2.1  United Kingdom

It has been estimated that during the nineteenth century, the British Empire covered one quarter of the world’s surface.\(^{1723}\) In terms of socio-economic conditions, the UK ‘is a leading trading power, financial centre, and is the third largest economy in Europe’.\(^ {1724} \) Due to its strong economy, the country was able to adopt a solid social


\(^{1724}\) CIA, *United Kingdom*, above n 1100.
security system in the course of the twentieth century.\textsuperscript{1725} In addition, the UK ‘has historically played a leading role in developing parliamentary democracy.’\textsuperscript{1726} It has long been a democratic country. The \textit{Magna Carta} of 1215 limited monarchical power, instituted the rule of law, and guaranteed certain rights; some 50 years later came the inception of the country’s first elected parliament.\textsuperscript{1727} Democracy in its now commonly recognised form, however, only came into being far later, with the franchise extended to non-landowners in the nineteenth century, and women in the twentieth — the very period when British power was at its height on the Indian sub-continent.

The rights and freedoms of the people in the UK have been further strengthened by the \textit{European Convention on Human Rights (ECHR)}, which led to the adoption of the \textit{Human Rights Act} in 1998.\textsuperscript{1728} The enforcement of this Act and utilisation of access to the European Court of Human Rights (ECtHR) has introduced an additional level of appeal and a new force in regards to human rights issues.\textsuperscript{1729} In terms of specific legislation regarding data privacy and protection, the UK implemented the EU \textit{Directive 95/46/EC}\textsuperscript{1730} in the \textit{Data Protection Act (DPA) 1998} (which entered into force on 1 March 2000). This Act has enshrined eight data protection principles.\textsuperscript{1731} Because of these developments, the concept of human rights is well developed and the human rights situation in the UK is well organised compared to that of many other countries, including Bangladesh. All the above factors have
contributed substantially to the introduction of new dimensions in human rights, such as privacy generally and genetic privacy more particularly. DNA profiling, the methods of DNA sample collection and storage, are part of this new dimension, as are informed consent and other rights of data subjects, the ensuring of their rights, as well as keeping or making data subject aware of their rights. As a result, there is a better scope for considering and enforcing human rights and the right to privacy in the application of DNA information in the justice delivery system in the UK jurisdiction than in countries elsewhere.

However, it is of course a matter of debate as to how far UK intends to protect the right to privacy (including genetic privacy) in the context of the forensic use of DNA data, and as to what extent it has provided such privacy protection. Despite the UK parliament having approved the DPA and this Act having enshrined eight data protection principles,\(^\text{1732}\) in 2004 the European Commission ‘expressed concerns about the UK’s insufficient implementation of Directive 95/46/EC in a number of areas’ in a formal ‘letter of notice’ to the British government.\(^\text{1733}\) In addition to concerns regarding right of access to personal data, international data transfer and the Commissioner’s lack of investigative powers, and a lack of sanctions, confusion persisted for some time ‘about what constitute[d] “personal data” under UK data protection rules’.\(^\text{1734}\) In 2010 the European Commission again criticised the UK regime in a reasoned opinion that recommended that the UK DPA ‘be amended to better implement Directive 95/46/EC …, including … the monitoring and enforcement powers of the Information Commissioner’s Office’, with changes to include ‘random checks on those using or processing personal data’ and subsequent enforcement of sanctions.\(^\text{1735}\) It has been said, moreover, that ‘the English common law has historically never embraced the idea of a right to privacy’,\(^\text{1736}\) while a ‘prominent jurist’ has stated that ‘[i]t is well-known that in English law there is no right to privacy.’\(^\text{1737}\) Indeed, before the implementation of the HRA in 1998, British

\(^{1732}\) DPA. See also Privacy International, ‘United Kingdom’, above n 665. For further details see section 3.1.3.3 (b) of Chapter 3.


\(^{1734}\) Ibid.

\(^{1735}\) Ibid.


law offered a largely ‘incomplete scheme of privacy protection’.

The UK has been a party to the ECHR since its foundation, which has entailed its ‘limited incorporation … into domestic law, including the right of privacy’. Nevertheless, Britain’s legislative response has been described as ‘limited’ and its judicial interpretation as ‘cautious’. 

Judgments by the ECtHR have also led to criticism regarding the degree to which the UK has surrendered jurisdiction to the European Court, with a call by the Lord Chief Justice himself for greater debate. Whatever might be the government’s intention or policy human rights generally or privacy protection in particular, the people of the UK are more aware about their human rights and privacy violations. A notable example is provided by the *S and Marper case* and the relevant issues regarding this debate have been raised and discussed in previous chapters, has and will be further addressed in the later discussion of this chapter.

### 7.1.2.2 Bangladesh

In contrast to Britain’s colonial role as ‘coloniser’; for much of the nineteenth and twentieth centuries Bangladesh was ‘the colonised’, a colony ruled by the British government. This rule has provided the basic administrative and legal foundation for the Indian sub-continent. Most of its cultural, economic, social values have

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1738 Fenwick, above n 664, cited in Swergold, above n 172, 193.
1740 Ibid.
1741 There have even been calls to withdraw from the Court whilst adhering to the Convention in the way the UK ‘saw fit’: Jason Groves, “Europe’s Human Rights Court is Out of Control … We Must Pull Out!” Call by Top British Judge after Ruling that Prisoners Should Get the Vote’ Daily Mail (UK) 7 February 2011 <http://www.dailymail.co.uk/news/article-1354362/Europes-human-rights-court-control-pull-Call-British-judge-ruling-prisoners-vote.html>. The judge involved was Lord Hoffman, himself a ‘human rights activist’ with longstanding connections to Amnesty International.
1742 See, eg, House of Lords, Unrevised Transcript of Evidence Taken before the Select Committee on the Constitution Inquiry on Judicial Appointments Process, Evidence Session No 5. Heard in Public. Questions 162–19: Lord Judge (Lord Chief Justice) at 2–5 and Lord Phillips at 4. Lord Judge states that while ‘the legislation [Human Rights Act] is absolutely unequivocal that decisions in the European Court of Justice are binding on this country … [but we need to debate] what we really do mean in the Human Rights Act, or what Parliament means in the Human Rights Act when it said the courts in this country must take account of the decisions of the European Court of Human Rights. I … think it is at least arguable that, having taken account of the decisions of the court in Strasbourg, our courts are not bound by them. They have to give them due weight; in most cases obviously we would follow them but not, I think, necessarily’ (emphasis added).
1743 For further details about this case see section 3.1.3.4. (a) of Chapter 3 and 5.1.6.2 (a) of Chapter 5; see also *S* (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008).
1744 For further details see 6.2.1.1 of Chapter 6.
1745 In this regard M Shah Alam remarks that, ‘British influence proved to be the strongest and most far-reaching’, Alam, ‘Bangladesh’, above n 1499, 116; see also Panday and Mollah, above n 1514, 6.
been mediated by the two hundred years of colonial rule. The disputed subsequent division of the Indian sub-continent by the British government in the Partition that preceded independence did not totally erase that heritage, nor did the emergence of Bangladesh as an independent state after years of domination by West Pakistan. However, in terms of resources Bangladesh (currently ranked the 94th smallest yet 7th most populated country in the world) is also ranked as among the ‘low-income economies’ by the World Bank. The whole process of colonialism — both by the British as well as in terms of Pakistani suppression — followed by a further two terms military regimes negatively impacted the overall socio-economic development and basic human rights situation of Bangladesh. Thus basic human rights could not be guaranteed for Bangladeshi citizens for a considerable period of time. Moreover, even though the country has signed a number of important human rights treaties, its human rights situation is not consistent enough both in terms of law and in practice. This is reflected in the incomplete nature of its legislation and provision of guidelines for the use of DNA technology generally and for forensic purposes in particular, as well as in other areas.

7.1.2.3 Comparative Evaluation: Gaps between the UK and Bangladesh

From a comparative analytical point of view, it can be argued that there are some basic disparities or gaps between the UK and Bangladesh in terms of their respective legal-political, socio-economic, and human rights situations. These gaps have influenced the overall legal system and mode of justice delivery in these two countries. Bangladesh and the UK originated in two largely different historical contexts and, therefore, differ fundamentally in their legal-political and socio-economic development at a number of points. Nevertheless, both share the same perception of the role of technology and intend to make use of DNA technology in their justice systems. The forensic use of DNA profiling has contributed much to the

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1746 For further details, see section 6.1.3.1 of Chapter 6.
1747 Ibid.
1750 For further details, see section 6.1.1 of Chapter 6.
1751 For further details, see section 6.1.3.2 of Chapter 6.
1752 Ibid.
justice delivery systems of both the UK and Bangladesh. It will be interesting to see if the two countries that so differ in their socio-economic background and human rights situation can achieve the same objective in using this technology. It is therefore critical to compare the situation in these two countries with regards to the use of the DNA technology in their respective justice systems and the implications of these uses in terms of individual privacy and the human rights situation. The next section will compare and analyse the two forensic DNA facilities: the NDNAD of the UK and the NFDPL of Bangladesh.

7.1.3 COMPARATIVE ANALYSIS BETWEEN THE NDNAD AND THE NFDPL

The NDNAD plays a vital role in the case investigation and justice delivery process of the UK legal system. It ‘currently holds the DNA of all people who have had their DNA taken after being arrested for a recordable offence’. In 2009 when it contained the DNA profiles of 7.39 per cent of the UK population, the NDNAD was considered to be the most extensive database in the world on a per capita basis, and also the largest database in Europe, and second only in size to that of the USA. On the other hand, the NFDPL was set up on 23 January 2006 in Bangladesh under the MSP-VAW project funded by the Danida in order to assist in prevention of violence against women as well as to ensure speedy and smooth trial. The NFDPL is not a police database, and currently it is in the process of transformation into a fully-fledged national DNA database for Bangladesh. These two case studies (NDNAD and NFDPL) address the following two main research questions of this study:

1. Is there any scope for human rights and privacy violations in the context of forensic use of DNA data, and how can these issues be balanced with public interest or state security measures?

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1755 Koops and Goodwin, above n 1477; ICPO-INTERPOL, ‘INTERPOL Global DNA Profiling Survey Results and Analysis 2008’, above n 66, 42.
1756 Liberty, DNA Retention, above n 1753.
1757 Ibid.
1758 For further details see 6.1.4.1(b) of Chapter 6.
2. *Is there any gap between developed and developing countries concerning the forensic use of DNA data in the justice delivery system, and how can this gap be addressed and/or minimised?*

7.1.3.1 *Comparative Analysis*

After analysing findings from two case studies (in chapters 5 and 6), some significant problems have been identified. Those problems are common to both the UK and Bangladeshi systems. The key issues comprise concerns about

a) the extensive power of police regarding collection and use of DNA data,
b) informed consent,
c) retention of DNA samples and profiles,
d) risks regarding the inclusion of child offenders, and
e) access and use of DNA data.

These issues or problems mainly fall under this study’s first research question — ‘human rights and privacy violations’.

**(a) Concerns about Extensive Power of Police regarding Collection and Use of DNA Data**

The analysis of the two forensic DNA systems has revealed that there are some similarities as well as differences on the issue of police power in regards to collection and the use of DNA data both in the UK and Bangladesh. Among the similarities is the fact that neither database has been established by a specific Act of parliament. Among the differences are the scope of powers accorded law enforcement personnel, their skill levels, and the availability of training. In the case of the NDNAD, the UK law enforcement agencies are highly skilled and well-trained. The UK legislation also provides extensive police powers for taking and retaining DNA samples and profiles. In 2003, the relevant legislation was ‘further amended … to permit requests for samples in any arrest, no matter how minor or dubious the crime’. Therefore, the UK police exercise unfettered power while collecting and retaining DNA samples. The extent of this power has been widely criticised. Anthony Mark Cutter observed that the UK had ‘seen a gradual expansion of police powers relating

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1759 GIPA, s 82; CJA s 10; see also Koops and Goodwin, above n 1477.
to the collection, retention and use of DNA and related samples’, 1761 a process that has been facilitated by a relaxation of the rules applying to such procedures and a lowering of threshold values for collection, use and retention. 1762 This, as well as the resulting broadening of the scope of database and its growth, has been criticised as providing greater opportunity for misuse.

In this regard, the main concern is that the exercise of such power increases the possibility of violation of the human rights and privacy. Concerns have also arisen regarding the powers of police in regard to sample selection. Accusations of skewed selection or bias in regard to sampling have been made. 1763 Initial findings of a higher representation among a particular population (perhaps in regard to a particular crime) may simply be the result of existing bias affecting policing or be a genuine statistical observation; however, subsequent targeting of that population inevitably ‘confirms’ and intensifies the skewing of the statistics by reducing the representation of other groups in the sample group. Such sampling can result in a ‘self-fulfilling prophecy’ where targeting the specific group results in a greater detection and conviction rate per head of population for particular offences than for the less tested group.

Specific groups (such as young males and black ethnic minorities) 1764 are disproportionately represented on the NDNAD. Such unequal representation highlights the fact that collection and sharing of DNA information is not equally distributed amongst all citizens. Undermining the ‘principle of presumption of innocence’, such representation inevitably incriminates them. Supporting this view, GeneWatch suggested that:

1761 Anthony Mark Cutter, ‘To Clear or To Convict? The Role of Genomics in Criminal Justice’ (2006) 2(1) Genomics, Society and Policy 1, 8
<http://www.lancs.ac.uk/fss/journals/gsp/docs/vol2no1/AMCGSPVol2No12006.pdf>.
1762 Ibid 4.
1764 For further details see section 5.1.6.1(d) of Chapter 5.
... The three main areas of concern about the NDNAD are: its impacts on people's privacy; the potential for misuse by governments; and whether it discriminates against certain groups of people.1765

Similarly, all other things being equal, researchers have observed differences in relation to rates of conviction, remand, and imprisonment, as well as in terms of sentence length, parole application success rates and so forth.1766 This may be seen as evidence of a societal wide problem, from which policing, and particularly DNA sampling and data collection and use, would not be immune.

In contrast, in Bangladesh there is no such legislation providing police any power in regard to DNA sample collection and its use. With the interpretation of other relevant existing laws, this gap is being addressed by the country’s legal system. As a result, police power in Bangladesh is not as wide as in the UK. Moreover, in Bangladesh DNA sample collection and identification of victim and/or suspect are conducted mostly by members of the police force that lack skill and training in this field.1767 Because, forensic DNA profiling and the NFDPL is a recent phenomenon in Bangladesh, the police force of Bangladesh does not have adequate knowledge about DNA technology, neither do they have adequate training on how to obtain DNA samples without contaminating them, nor have they guidance in regard to the protection of the privacy of this sensitive data.1768 Since the concept of right in privacy, particularly ‘genetic privacy’, is not well established in this country, in most instances the Bangladeshi police do not even sense the value of individual and family privacy and, thus, the need to protect it. In the same way, the police of Bangladesh are not as skilled as those of the UK. On the other hand, racial discrimination is not the issue in Bangladesh that it is in the UK; therefore there is generally no prejudice practice towards any specific groups or ethnic minorities in Bangladesh.1769 Whilst

1767 For details see section 6.1.5.2 (c) of Chapter 6.
1768 Ibid
1769 However, it is noted by Saleem Samad that ‘[s]tatus of minorities all over the world has demonstrated a pattern of discrimination and insecurity. Bangladesh is no exception.’ For instance, ‘[r]acial riots wrecked the traditional secular image of Bengal, on the eve of the second paratition of Bengal in 1947. The racial violence is often blamed to the British colonialists, which tore the silence in otherwise [quiet] Bengal’: Saleem Samad, State of Minorities in Bangladesh: From Secular to
there have been allegations of unequal treatment in regards to certain minorities in Bangladesh (notably the indigenous peoples of the Chittagong Hill Tracts), and examples of inter-community violence even in recent times as well as individual instances of racially or religiously motivated violence, there has been no apparent systematic skewing of policing activity in any way similar to that reported in the UK.

However, the existing bureaucratic, administrative and even judicial systems in Bangladesh are widely acknowledged as those of the most corrupt country in the world. It is, therefore, no surprise that the law enforcement agencies are subject to political manipulation and corrupt practices. A 2007 survey by Transparency International Bangladesh, for example, revealed that ‘96.6% among the surveyed households experienced harassment and corruption during interacting with or receiving services from law enforcing agencies’. The Survey notes that ‘corruption and harassments among the law enforcing agencies are so institutionalized that incidence of corruption and harassments are almost equal in both rural and urban areas’. The key offence reported was bribery (41.6 per cent of surveyed households), while misbehaviour figured in 21 per cent of reported irregularities, the threat of torture in almost 11 per cent, and arrest without warrant in

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1771 Not in present Bangladesh but it happened during the liberation war of 1971, for example, Leung and Meggitt noted that ‘[i]n 1971, the Hindu population was specifically targeted for attack by the Pakistani army across Bangladesh … this racially motivated violence has resulted in a decline of the Hindu population in Bangladesh, estimated to be 28% in 1941 but dropping to10% in 2001’: Mikey Leung and Belinda Meggitt, Bangladesh (Bradth, 2009) 23.

1772 See, eg, Naureen Chowdhury Fink, 'Bombs and Ballots: Terrorism, Political Violence, and Governance in Bangladesh' (International Peace Institute, February 2010).

1773 Almas Zakiuddin argued that:

    A general impression conveyed by the media and by popular discourse is that among ordinary people in Bangladesh, corruption is viewed quite clearly as ‘a way of life’. A recent survey carried out by the Bangladesh Unnayan Parishad reinforces that impression: the survey found, among other significant data, that 95 per cent of respondents believed that the police were the most corrupt department in the land, followed very closely by the customs, the department of excise and taxation, the bureaucracy, and the judiciary.


1774 Transparency International Bangladesh (TIB), 'National Household Survey 2007 on Corruption in Bangladesh' (18 June 2008) 34.

1775 Ibid 34.
8 per cent. Also reported were the filing of false charges (almost 7 per cent) and negligence in filing cases (4.3 per cent).\footnote{Ibid 34–5.} Given the above, the highly sophisticated, sensitive, and mostly useful DNA technology could possibly be misused in the justice delivery system of Bangladesh, particularly with regards to human rights and privacy violations.

In both systems, police play a crucial role in the collection of DNA samples. The UK NDNAD is a police database and British legislation provides extensive police powers for taking and retaining DNA samples and profiles. In case of the NFDPL of Bangladesh, victims or suspects are also identified by the Bangladeshi police force at the first instance.\footnote{For details see section 6.1.4.2 (a) and 6.1.5.2 (c) of Chapter 6.} Personal information (such as name, age, gender, parents’ names, addresses and so forth) is collected by them. The interesting point to be noted here is that although the mode, nature and way of application of police powers are different in these two jurisdictions, nevertheless there is a wide scope for violation of human rights and privacy — through the use of this police power and their practices — both in case of the NDNAD and the NFDPL.

(b) Informed Consent Issues

Informed consent is another important issue. In case of the NDNAD, the UK police are legally authorised to obtain a DNA sample without consent of any individual who is arrested for a recordable offence (conviction is not a prerequisite).\footnote{CJA s 10.} This is a clear violation of individual privacy, autonomy and dignity. Moreover in cases where samples are obtained and retained with consent, once such consent is given by any volunteer (either victims, witnesses or others who are supporting the law enforcement mechanism), their decision is irrevocable, that is they have no right to withdraw their consent.\footnote{See section 5.1.5.6 (d) (iii) of Chapter 5. See also CJPA s 82(4); Johnson and Williams, ‘DNA and Crime Investigation’, above n 1410; Swergold, above n 172, 185.} There is also a lack of clarity as to whether the consent obtained by the police from volunteers can always be regarded as genuine or free consent, as it is often given under pressure.
In contrast, the current practice of the NFDPL is to obtain consent from the victim or suspect (that is, the sample providers) by collecting their signature on the ‘identification form’. Sample providers are not, however, given a separate briefing and or explanation about DNA sample collection (for example, the sample collection process, storage period, subsequent use, and consequences if data derived from it is ‘leaked’ to interested third parties, and any related impacts). The sample providers are ‘informed’ as part of the process, but arguably the information and the process are not adequate in terms of the international standards.\textsuperscript{1780} It can therefore be alleged that they are not informed that their consent is supposed to be free, informed, free from other pressure or any duress, nor are they advised that they can withdraw their consent any time. Hence, the existing system and practice of the NFDPL fails to meet the basic standard or norms of ‘informed consent’. As the general population is neither well informed nor sufficiently aware of their rights, they are generally willing to supply their DNA samples and are not generally aware of the possibility of subsequent use. If sample providers do not give their consent freely, or are not being properly informed, or are unaware of their right to withdraw consent, then the collection and use of their DNA samples in the justice delivery system is nothing but a violation of human rights and privacy (including genetic privacy) of the person concerned.

After analysing the existing rule and or practice of the NDNAD and the NFDPL, it can be argued that in both systems the ‘issue with regards to informed consent’ exists, although the specific nature of the issue differs. Police are involved in the process of obtaining informed consent in both the systems. A striking difference, however, is that UK legislation has accorded UK police unfettered power to collect DNA sample \textit{without consent} from almost anyone, including minors above 10 years of age (but below 18 years of age).\textsuperscript{1781} Due to this parliamentary provision, the UK domestic courts do not even interfere in this issue. However, there is no such

\textsuperscript{1780} Although Bangladesh is under an obligation to follow international ethical guidelines for biomedical research involving human subjects, how such norms are implemented ‘in real life’ depends on the researcher working in the field. Research in a developing country context also carries with it complications regarding participant incomprehension of the concepts involved, false beliefs and hopes and so forth. For further details see Niels Lynøe et al, ‘Obtaining Informed Consent in Bangladesh’, Letter to the Editor, (2001) 344(6) \textit{New England Journal of Medicine} 460 <http://www.nejm.org/doi/full/10.1056/NEJM200102083440617>.

\textsuperscript{1781} For further details see section 5.1.6 (g) of Chapter 5.
legislation nor any policy or guidelines to guide the NFDPL regarding how to obtain informed consent from the sample providers. There is only a _draft DNA Act 2010_ which has not yet been enacted. Problems exist in Bangladesh mainly because of the practices of the NFDPL, not because of the law (which is the case in the UK). Although there are differences in both of these systems (that is, the NDNAD and NFDPL), nevertheless the ultimate result is same — human rights and privacy violations.

**(c) Concerns regarding Retention of DNA Samples and Profiles**

Under the current arrangements of the NFDPL, various kinds of DNA samples are retained for almost two years and DNA profiles are retained indefinitely. The individuals’ DNA profiles and personal information are retained both in the electronic and hard copies at the NFDPL. Paper files or hard copies containing DNA analysis results are kept in the personal custody of the laboratory head. No person other than scientific officers can access these files. Electronic or computerised DNA profiles are retained in the computers of the laboratory head and those of the scientific officers.\(^{(1782)}\) As in the case of other operations of the NFDPL, it is merely practice that guides sample and data retention at the NFDPL. This is not guided by any legislation, nor by any data retention rule or policy. Furthermore, there is no security policy and mechanism for this laboratory. The provision of a proper backup facility for data retention is also very poor at the NFDPL. Consequently, the storage and retention of DNA samples (for two years) and profiles combined with a poor security system seem to pose a significant threat to human rights and privacy.

In the UK, the situation has been very different. Before the 2001 amendment to the _PACE Act_, DNA was only collected by the UK police when a person was charged with an offence and was destroyed if the person was acquitted. The scope widened with the enactment of the _Criminal Justice and Police Act 2001_ (hereinafter referred to as the _CJPA_), which amended the _PACE Act_ to allow DNA samples to be kept indefinitely. Since then, ‘the issue of retention of innocent individuals’ DNA has become central to debates regarding the proportionality and balance of police uses of the NDNAD’.\(^{(1783)}\) Moreover, ‘[a] number of judges\(^{(1784)}\) and senior police officers have

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\(^{(1782)}\) For further details see sections 6.1.4.2 of Chapter 6.

\(^{(1783)}\) Johnson and Williams, ‘DNA and Crime Investigation’, above n 1410, 79.
called for the expansion of the database to cover the entire population'. This would be a significant increase from the current level of 7 per cent of the population who are now on the database. In addition, while ‘successive Acts of Parliament have expanded the grounds allowing for retention of DNA (samples and profiles), the law has been silent on the creation of a framework for deletion’. The policy of indefinite retention of the DNA of anyone arrested means that a large number of innocent people, including thousands of children, have had their DNA data permanently retained. The reason why they should be categorised as innocent is because many such persons have been arrested — but not subsequently been proved guilty of a crime. In *S and Marper v the UK*, the applicants moreover claimed that the retention of DNA data ‘casts suspicion on unconvicted persons implying that they were not “wholly innocent”’. Furthermore, retention of the DNA profiles of a large number of innocent people ‘who have never been convicted of any crime’ in the NDNAD ‘compromise[es] the long-standing tradition of presumption of innocence in the UK courts and the principle of equal treatment before the law’. Liz Campbell further argued that:

Non-conviction DNA databases embody the state’s suspicion of the risk of (re-)offending on the part of certain people, thereby distinguishing them from “truly” innocent people who have never come to the attention of the police. In

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1786 Ibid.

1787 Isabella Sankey, ‘Liberty’s Response to the Human Genetic Commission’s Consultation on the National DNA Database’ (Liberty, 2008) [4].

1788 Privacy International argued that, ‘over 7 per cent of the population is now included in the system and this includes over 800,000 people who have never been convicted of a crime’: Privacy International, ‘United Kingdom’, above n 665.

1789 *S* (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [89].


broad terms, this may compromise the precept that everyone should be presumed innocent, by keeping the DNA of legally innocent individuals on a database which is otherwise populated by convicted persons.\textsuperscript{1792}

It creates a division of persons into a ‘risky’ population and others who had not come to the attention of the police (however innocently), which is prejudicial to equality before the law. Certainly the current position embodied in the \textit{CJPA 2001} and \textit{Criminal Justice Act 2003} particularly is incompatible with the principles of human rights and privacy. In this respect, the ECtHR in the case of \textit{S and Marper v UK} held that the ‘blanket and indiscriminate’ retention of DNA in the NDNAD violated the right to a private and family life.\textsuperscript{1793} The ECtHR ‘decision [also] rejected the UK’s DNA retention policy in strong terms, stating that it was “entirely improper and prejudicial” for samples to be retained where there was no “reasonable relationship of proportionality to the purported aim of crime prevention”’.\textsuperscript{1794} The Court concluded that ‘the proper balance was not met given the failure of British authorities to consider, \textit{inter alia}, the nature of the crime, the age of the suspect, and the indefiniteness of sample retention’.\textsuperscript{1795} The blanket retention of innocent people’s DNA in the NDNAD in this way remains disproportionate, discriminatory and is also a breach of right to privacy according to the \textit{HRA}. The question must also be raised as to why (controversially) the UK government permits the NDNAD to retain the DNA records of innocent people and yet has failed to retain the DNA data of persons convicted of serious offences. For instance, Home Office has admitted that thousands of convicted prisoners (among others) do not have their DNA profiles logged on the NDNAD although their details are held by the national police computer; yet the DNA data of innocent peoples are collected and logged onto this database. A conservative parliamentarian highlighted that:

The Home Office admitted almost two years ago [2008] that there were 2.3 million people who had been convicted, cautioned or warned and had a record on the police national computer but did not have their DNA profile logged on the database. This contrasts sharply with the number of innocent people —

\textsuperscript{1792} Campbell, ‘Non-Conviction” DNA Databases and Criminal Justices’, above n 1790, 70.
\textsuperscript{1793} S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [119], cited in Campbell, ‘Non-Conviction” DNA Databases and Criminal Justices’, above n 1790, 68.
\textsuperscript{1794} S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [127].
\textsuperscript{1795} S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008), cited in Swergold, above n 172, 192.
more than 975,000 at the last count—who have been arrested but never charged or convicted of an offence yet whose DNA has been collected and logged.\footnote{Alan Travis, ‘DNA Database Missing Profiles of Thousands of Prisoners’, \textit{The Guardian} (online) 18 February 2010 <http://www.guardian.co.uk/politics/2010/feb/18/prisoners-dna-database>.}
The then Opposition member further argued that the government seemed ‘more concerned with collecting the data of innocent people than convicted criminals’.\footnote{Ibid.}
He expressed shock that the government was unaware that many ‘dangerous criminals do not have their DNA on the database’.\footnote{Ibid.}
He argued that the database ‘should help the police’ in case investigation; however, it should not contain the data of the ‘innocent majority’, but rather ensure that the data of ‘anyone convicted of a serious crime’ is on the database.\footnote{Ibid.}
Helen Wallace of GeneWatch argues that ‘the retention of DNA profiles ... from an individual on [the] database ... [will also] allow a form of biological tagging or “biosurveillance”’, that involves not only the individual concerned but their relatives.\footnote{Wallace, \textit{Prejuduce, Stigma and DNA Databases}, above n 12. She also points out that there is a ‘significant potential for others — including organised criminals — to infiltrate the system and abuse it, for example by using it to reveal changed identities and breach witness protection schemes’: at 11.}

A comparison with the NFDPL reveals a number of differences with regards to the nature of the database itself, the criteria for retention, and the retention period. The NDNAD is a police database, whereas in case of the NFDPL, it is not police database but a database used in the police investigation process. In terms of the retention criteria, samples and resulting profiles of the innocent (witnesses, victims, non-convicted suspects and so forth) are retained on the NDNAD as outlined above, while the NFDPL has yet to set any criteria. Under the \textit{draft DNA Act 2010}, however, two types of profiles will be kept on the database: namely, convicted offender profiles and SOC profiles. In terms of the retention period, the NDNAD retains DNA samples indefinitely, whereas DNA samples are retained for 2 years of the NFDPL under its current policy. Both retain the resulting profiles indefinitely. Another difference is that the NDNAD — unlike the NFDPL — seems to have adequate back up facilities and security mechanisms in regard to samples and
profiles. There is as yet no controversy regarding the practice or law on the part of the Bangladesh government in terms of the retention of the DNA data of innocent persons. This reason has earlier supplied is that the use of DNA technology is quite new for the country’s legal and judicial systems; therefore, various issues and concerns with regards to the retention of DNA samples and profiles — which has been identified through the analysis of the UK legislations and from the practice of the NDNAD — are absent in the case of the NFDPL. Nevertheless, in both systems ultimate results are same — indefinite retention of DNA data can lead an increased risk of human rights and privacy violations.

A number of legal proceedings have already taken place in the UK in regard to the human rights and privacy violations in this context. This has occurred mainly due to the legislative provision for the indefinite retention of DNA data. Similar violations of privacy could also take place in regard to the NFDPL due to the legislative vacuum in this area, and also due to the ignorance and/or lack of awareness of people generally about the potential misuse of sensitive DNA data and the inadequate data storage facilities in the NFDPL of such data.

(d) Risk Posed by the Inclusion of Child Offenders and Other Minors

Under the current Bangladeshi investigation system, there is as yet no process of mass screening, speculative searching and/or familial searching for detecting criminals. Samples are, however, collected from victims, and even from innocent children, and the resulting profiles are currently stored on the NFDPL. There are regular instances of DNA testing and profiling of innocent children or child offenders in the NFDPL. The ages range from new born up to less than 18 years old. Samples are normally collected from new-borns for paternity testing and sibling matching, while samples are also collected from children in the 14–16 age group in rape and murder cases.

By way of contrast, under the Crime and Disorder Act 1998 any child aged 10 or over in the UK (England and Wales) can be arrested on suspicion of a criminal offence, and thus be subject to DNA testing and their profile retained on the

1801 Though the potential exists, as can be seen in the following section on minors (7.1.3.1. (d)).
1802 The draft DNA Act 2010 adds the category of mentally ill persons.
1803 CDA ss 1, 11.
NDNAD. The retention of DNA samples and profiles of children and young teenagers on the NDNAD is, therefore, an additional concern. The retention of DNA can be ‘particularly detrimental to children’ as was pointed out in the case of S\textsuperscript{1804} in the *Marper case*. Sometimes vulnerable individuals, such as children or ill persons, can find having their DNA taken and their records kept particularly disturbing and some individuals have even become suicidal as a result.\textsuperscript{1805} In response to the *Marper case*, the UK government decided that DNA profiles from the children under the ten years of age should be removed from the NDNAD. However, the profiles from other child offenders (that is, children above 10 years but below 18 years\textsuperscript{1806} of age) are still on the database.

Although the age range and nature of the offence for which child or juvenile offenders DNA data are collected and retained are different in the NDNAD and the NFDPL; the issue is similar in both systems, namely the ‘inclusion of the DNA data of child offenders together with that of adult offenders’. Whilst both the NFDPL and NDNAD treated all samples and data derived alike, the data of children is more sensitive. The ‘equal treatment’ increases the likelihood of violating a child’s rights. Moreover, the current policy of retaining children’s DNA on arrest confers the risk of locking them into the criminal justice system for the rest of their lives.\textsuperscript{1807} Given that many subjects are actually not guilty of any crime or enter the system with a minor ‘one-off’\textsuperscript{1808} offence, the resulting impact of the process can be counterproductive, in terms not only of the individual but also in terms of overall confidence in policing. In particular, it has been argued that ‘[s]tigmatising children and young people for minor crimes or on the basis of false accusations can also be counterproductive’ and there is even ‘some evidence [to suggest] … that this may make them more likely to commit offences in the future’.\textsuperscript{1809}

\textsuperscript{1804} S (Eur Court HR, Grand Chamber, Application Nos 30562/04 and 30566/04, 4 December 2008) [89].
\textsuperscript{1806} CRC art 1.
\textsuperscript{1807} For further details see 5.1.6 (g) of Chapter 5.
\textsuperscript{1809} Gene Watch UK, DNA Database and Human Rights, above n 1782.
(e) Real Life Examples

Despite the existence of several legislative, ethical and administrative safety mechanisms, nonetheless there are practical examples of human rights and privacy violations in the UK jurisdiction. For instance, in the precedent-setting case of *S and Marper v UK*, the ECtHR held that the ‘blanket and indiscriminate’ policy of permanent retention violated the right to privacy of the appellants. Even after the *Marper* judgment, a violation of individual privacy was again before the UK courts.\(^{1810}\) In this instance, the outcome was similar to that of the *Marper case*. Several government and legislative initiatives have been taken in the UK in response to the *Marper case*; however, to date the changes being undertaken to comply with the *Marper* judgment have not yet been finalised.

In contrast, the NFDPL is a recent development for Bangladesh. There are no instances or case judgments or precedent — like that provided by the *Marper case* — about privacy violations arising in the Bangladeshi jurisdiction in the course of the investigation of a case or the use of DNA data in its justice delivery system. All emerging or related issues with regard to this new technology (including the concept of genetic privacy and its violation) are new to the Bangladeshi people. The people need first to be aware of the potential for such issues in order to address matters that might emerge in Bangladesh in cases like that of *S and Marper v UK*. Though genetic privacy issue is not contested in Bangladeshi court, nevertheless the *Marper case* could provide a good example for many countries, including Bangladesh, as to the matters that need to be taken into consideration in terms of human rights in the construction and maintenance of DNA data systems.

### 7.1.3.2 Human Rights and Privacy Violations

It is evident from the existing practices of both the NDNAD and the NFDPL that there is scope for violations of human rights and privacy. In the case of the NDNAD, several legislative amendments\(^{1811}\) have been made one after another. Instead of improving the human rights situation of sample providers, however, most — if not all — of these changes have instead provided ever more extensive police powers

\(^{1810}\) For further details see 5.1.6.2 (a) of Chapter 5; see also *R (On the Application of GC and C [2011] UKSC 21*) (18 May 2011).

\(^{1811}\) *CJPOA, Criminal Evidence (Amendment) Act, CJA, SOCPA, CTA and CSA.*
regarding the collection, storage, analysis, retention, access and use of the DNA data. In the case of the NDNAD, problems related to these (as well as the issue of informed consent) are individually and/or jointly responsible for violations of human right and privacy.

It may be argued that the challenges that the NDNAD currently faces are unilateral or one dimensional — that is, they are a reflection of current UK government policy and are mainly based on legislation. Through the series of legislative changes mentioned above, the government has indicated that at this moment the control of crime is their priority, rather than the preservation of individual privacy. In Bangladesh, however, the problem is two-dimensional. First, there is a legislative vacuum and lots of controversial NFDPL practices continue mainly because of this vacuum; and second, the NFDPL lacks resources. Although some of those problems are independent social issues, many of them are directly related to the absence of legislation.

The introduction of relevant legislation will not solve all these issues entirely; nevertheless, law is necessary for this newly emerged technology in Bangladesh, as legislation — unlike a policy or guideline — has the capacity to be enforced, and normally does. Thus any new provision (mechanism, and so forth) introduced may have greater impact as it has the force of law, with accompanying sanctions for breaches. Moreover, the framing and enactment of legislation provides an opportunity for the community to become familiar with, or seriously think about, any proposed new system. If there is any law involved, people will be more aware about its application and related issues. The ignorance or lack of knowledge about forensic use of DNA among the masses is, therefore, somewhat due to the lack of legislation. In addition, any prospect of a greater role for the NFDPL in the justice delivery system of Bangladesh necessitates such an examination of legal parameters for its operation as well as of potential issues that may arise. However, the laboratory is already facing some challenges in regards to human rights and privacy violations. These could be addressed generally by appropriate legislation, as well as by increasing people’s awareness.
In the case of the NDNAD, the problems are created by controversial legislative provisions, and if these provisions could be changed or new provisions could be enacted overriding these provisions — which is the current plan of the UK government — then it could reduce the human rights and privacy violations risks in that country. On the other hand, in the case of the NFDPL, the opportunity or scope for human rights or privacy violations may occur due to a lack of legislation as well as some other inadequacies related to the NFDPL, such as the lack of people’s awareness of the issues and insufficient resources. Sometime both a lack of law and the presence of controversial law can be equally problematic.

Finally, it can be argued that there are human rights and privacy risks associated with the forensic use of human DNA data, if such data are not handled properly (that means from the initial collection stage, through analysis, storage, use, and to the indefinite retention stage). In this regard, reference can be made to Ricoeur’s distinction between idem (same) and ipse (self) identity. Ipse refers to ‘who the self is’ and it is close to our individuality, while idem refers to ‘what the self consists of’ — a more external possibility of identifying the self. According to this distinction, ‘DNA samples contain privacy-sensitive, ipse [self] related information, while DNA profiles contain much less, and largely idem [same] related, information.’ From the scope of extensive police power, lack of adequate informed consent, lack of protective measure for children’s’ DNA data, unlimited access and use as well as indefinite retention of DNA sample and other personal information, there is an apprehension regarding the ‘leaking of personal details’ of sample or data providers including much sensitive information ‘such as ethnicity or medical status’.

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1812 See also Koops and Goodwin, above n 1477.
1813 In his book ‘Oneself as Another’, Paul Ricoeur’ distinguishes between two fundamental aspects of identity: (1) identity as ‘selfhood’ (latin ipse), close to our individuality; or (2) identity as ‘sameness’ (latin idem) as a more external possibility identifying the self. For further details see Paul Ricoeur, Oneself As Another (Kathleen Blamey trans, Cambridge University Press, 1992), cited in Daniel Candel Bormann, If You Want to Know More: Ricoeur’s Idem and Ipse (2008) <http://www.literarycrit.com/addendumodule3individuaultyipseidemb.html>; see also David Vessey, The Polysemy of Otherness: On Ricoeur’s Oneself as Another (9 November 2011) <http://www.davevessey.com/Vessey_Ricoeur.html>.
1814 Ricoeur, above n 1813, cited in Bormann, above n 1813; see also Vessey, above n 1813.
1815 Koops and Goodwin, above n 1477.
1816 Gardner, above n 1790.


### 7.1.3.3 Gaps between Developed and Developing Countries

In addition to human rights and privacy violations, there are some other challenges (or problems) with regards to the sustainability of the databases and involve financial, technological and administrative issues. Different political, economic, social and cultural backgrounds of the UK and Bangladesh are reflected in the economic, administrative and technological gaps between the NDNAD and the NFDPL. The NFDPL is far behind the NDNAD in these areas.

Economic and technological gaps or differences between the NDNAD (UK) and the NFDPL (Bangladesh) are identified mainly from the case studies as well as by data analysis applying both qualitative and quantitative methods. These findings reflect the gaps between the NDNAD and the NFDPL (in terms of financial, human resources, technological and administrative matters). All of these issues are mainly (and understandably) a problem for the developing countries’ DNA systems (as typified by the NFDPL) as compared to those of the developed countries (as typified by the NDNAD of the UK). The following section of this chapter will compare the NDNAD and the NFDPL, more particularly to address the second research question:

*Is there any gap between developed and developing countries concerning forensic use of DNA data in the justice delivery system, and how can this gap be addressed and/or minimised?*

All the following issues will reflect the gaps between NDNAD and NFDPL (that is, between developed and developing countries):

(a) **Supervisory and Transparency Issues**

The NDNAD is subject to adequate supervision. There is also an ethics group overseeing its operations. Management and administration by these supervisory bodies and ethical monitoring seem to be of a very high quality. Nevertheless, objections have been raised about the overall governance as well as oversight of the NDNAD. For instance, it is argued that the monitoring systems do not work adequately because the original decision about the inclusion of DNA data on the NDNAD is ‘purely a police matter’. In addition, there are some complaints about...

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1817 For further details see section 5.1.5.3 of Chapter 5.
the extent of transparency of the NDNAD. These include that there is a lack of public debate and/or a lack of continuing consultation with relevant stakeholders.\textsuperscript{1819} Public confidence in its operation and governance and also public acceptance of the government approach are always of central importance. In response to a government consultation held in the wake of the \textit{Marper case},\textsuperscript{1820} the Human Genetics Commission (HGC) commented that while it appreciated the UK government having taken the initiative in undertaking this consultation and sought a broad range of public views on the NDNAD, it was quite unfortunate that such consultation could not have been undertaken before the Strasbourg court judgment had taken the initiative away from the government and resulted in debate being necessarily limited to measures needed to implement a ‘timely response’ to the decision rather than the desired broader discussion.\textsuperscript{1821} Another concern consistently expressed by the HGC in relation to public discussion about the NDNAD is in relation to the quality of debate.

Consultation and public debate need to be based on evidence and reasoned argument and the Government has a special responsibility to provide accurate, complete and balanced information. It is unfortunate that the debate has, at times, been clouded by rhetoric and skewed by anecdote, and that no discernible systematic attempt has been made to evaluate the utility of the database on the basis of robust and complete evidence.\textsuperscript{1822}

On the other hand, in the case of the NFDPL, while there is also a supervisory body for the NFDPL, namely the DNA executive board; its monitoring and oversight mechanism of is not as dynamic as that of the NDNAD. The NFDPL supervisory body is more a supervising body in name only rather than in action. However, the function of the board will be more transparent when the national DNA database for this country starts to work, as well as when people become more concerned and aware of their human rights and of privacy and human rights issues related to the forensic use of DNA data. Therefore at this stage supervisory issue is not big concern for the NFDPL. However, the nature and degree of supervision, transparency in relation to such matters and/or the existence or otherwise of a system of checks and balances could become a significant problem if the situation continues as it is. In

\textsuperscript{1819} Montgomery, above n 1438. See also section 5.1.6 (e) of Chapter 5.
\textsuperscript{1820} See generally UK Home Office, 'Keeping the Right People on the DNA Database’, above n 12.
\textsuperscript{1821} Montgomery, above n 1438, [6]–[7], [39].
\textsuperscript{1822} Ibid 416, 2.
order to ensure more adequate supervision, greater transparency and an efficient system of checks and balances requires more funds, skilled personnel, and a growth of public awareness. Yet, transparency is also an important ethical issue for the NDNAD. Its transparency problems, however, are not due to a shortage of funds or a lack of human resources, and/or weak administration, rather the system reflects the government intention or policy. The problem could be solved by changing the policy or the government’s view.

(b) Lack of Knowledge and Expertise
Since DNA profiling is a technology new to Bangladesh, most judges and lawyers in the country are unfamiliar with it. Furthermore, there is also a lack of knowledge among law enforcement agencies even as to how to collect DNA sample without losing its evidentiary value. In addition, there is shortage of human resources or skilled personnel in Bangladesh for DNA sample collection and analysis, as well as for the interpretation of the DNA analysis results before the court. Again, with its limited resources and manpower, the NFDLP finds it difficult to make people understand this technology, its various uses and related challenges. Experts claim that for the NFDPL to be properly utilised, there has to be far greater awareness about DNA profiling and its potential use among legal and judicial service providers (for example, law enforcement agencies, lawyers, judges and magistrates) as well as consumers (for example, victims, their family members, and people generally) regarding DNA data. Nationally, government can provide some training to judges, lawyers and magistrates. Internationally, governmental and commercial entities could step forward to assist developing nation’s databases. Such bodies could include the Forensic Science Service (FSS) (which could provide assistance with regards to technological training to the forensic scientists, or INTERPOL, which could provide training to the police.

Yet the FSS, one of the leading forensic service providers to police forces in the UK is currently in the process of being wound up.  

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1823 For further detail see section 6.1.5.3 (b) of Chapter 6.  
1824 For further detail see section 5.1.5.4 of Chapter 5.
in the use and interpretation of DNA data. However, this is a substantial financial, human resource and technological issue for the NFDPL.

(c) Uncertain Staff Appointment and Job Discrimination
The NFDPL consists of a small number of staff members who are appointed temporarily by the government on a time-limited project basis. In addition, there is what amounts to job discrimination in terms of this NFDPL staffing as some are appointed directly under the project and are paid under the rule of the project document, whilst others are appointed by a third party (that is, their appointment is outsourced to a human resource company, rather than being handled by the laboratory or project office). On the other hand, there is no such problem with regard to staff appointment for the NDNAD.

The problem exists because of the different economic structure and capacity of the two countries. It can, therefore, be argued that while the NDNAD has the capacity to retain its human resources, the NFDPL has no such capacity, and this is reflected in the gaps between the NDNAD and the NFDPL. In addition, varying employment conditions amounting to discrimination and uncertainty of employment are among the sensitive issues with regards to privacy protection, because dissatisfied or underpaid staff may leave and thus reduce the number of skilled personnel, which may compromise service quality, or if they stay their service quality be negatively affected by their level of dissatisfaction. Worse still, dissatisfied underpaid staff may be more open to corruption. There is the possibility that staff who handle sensitive DNA data may compromise data privacy as well as service quality for this reason. In addition, there is a possibility that they may not securely store this data.\textsuperscript{1825} This problem can be solved with the proper initiatives and measures taken by the government.

(d) Other Challenges and the Question of Sustainability
With regards to the issue of sustainability of the NFDPL, there are some significant problems facing the laboratory. In regard to the management of the NFDPL, these problems include the lack of an adequate training facility, insufficient laboratory capacity, a shortage of expertise, and inadequate physical security systems. These

\textsuperscript{1825} For further detail see section 6.1.5.3 (a) of Chapter 6.
challenges are creating basic impediments to the sustainability of the NFDPL. Uncertainty looms as the Government of Bangladesh has not yet included the laboratory in its budget, and there is no such plan or timeline in existence that indicates when the government will do so. As a result, the future of the NFDPL depends mostly on whether the Bangladesh government will accept the responsibility for funding and maintaining this laboratory, when the Danida funding runs out. Moreover, maintenance and use of such sophisticated technology in its justice delivery system is fairly ambitious project for the Bangladesh government without appropriate regional and/or international supports. In order to build the sustainable capacity of this laboratory, regular co-operation, greater collaboration, technology transfers, the sharing of knowledge, provision of training program on the part of other counties or international organisations (such as INTERPOL, UN and its agencies) will be needed.

On the other hand, despite some controversial practices and provisions, the NDNAD has run successfully for almost 16 years from its inception. It can, therefore, be argued that the NDNAD is sustainable. This means the country is capable — financially and technologically — of managing a forensic DNA database, unlike many low-income countries (for example, Bangladesh). In many cases, high maintenance costs are not a problem for the NDNAD. It can further be argued that the NDNAD and the NFDPL are established in two different legal-political, socio-economic situations, and so there are, in fact, some gaps between these two systems. Though there are some discrepancies, the objectives of the two databases and their respective governments are the same — that is, to maintain forensic DNA database services offering quality service and protecting privacy where they view it as necessary in their respective jurisdictions. Some collaboration and changes of policy can reduce the level of discrepancies and achieve this objective.

7.1.4 OPTIONS AND RECOMMENDATIONS

Having analysed the DNA facilities in the two countries as case studies and having compared the findings from chapters 5 and 6 with regards to human rights and privacy violations; and the gaps between the NDNAD and the NFDPL, the following recommendations are able to be proposed. In general, these options and
recommendations will provide guideline to ensure proper forensic use of DNA information in the justice delivery systems of both these countries:

7.1.4.1 **Safeguards for Human Rights and Privacy Protections**

Different legal, ethical, technical and administrative standards are set and followed by DNA databases in different countries. These principles and standards provide mechanisms designed to meet basic criteria to protect human rights and individual privacy. These safeguards also ensure the proper use, handling and managing of DNA data and of the databases in the case investigation process. As in other such systems, in the NDNAD and NFDPL there are various stages — collection and analysis, retention, as well as access and use of DNA samples and profiles — where human rights, particularly the right to privacy, can be violated. In order to monitor the whole system, there is also a mechanism of governance and oversight. Privacy could be violated if such a mechanism is not sufficiently robust. Therefore several safeguards need to be provided at each and every stage.

**(a) Collection and Analysis of DNA Samples**

There is a wide range of views in different jurisdictions, and there are also several opinions among various human rights organisations about DNA sample collection and analysis, especially when and how DNA should be collected by the police. There are some basic standards or parameters which are accepted by most countries, and such standards could or should be applied by the country concerned where deemed appropriate. The following parameters need to be taken into consideration:

- Under what circumstances should law enforcement agencies (that is, the police) be allowed to collect and store DNA samples and profiles?
- How DNA data should be included in the database (with consent or without consent)?
- Whether collection of DNA is directly relevant to the crime for which an individual has been arrested? Or can DNA be taken to detect an individual’s DNA profile against stored DNA profiles from other crimes?
- What other factors need to be taken into consideration while collecting DNA, such as the seriousness of the alleged offence, whether the individual has been charged or merely arrested, or their age or other circumstances?
• Should there be any independent oversight for these decisions, or should they be left to the discretion of the police?

• Whether additional safeguards are needed for people who give their DNA to the police on a voluntary basis during the course of an investigation (such as, a requirement that their consent be fully informed and freely given, without coercion from the police or others, and that they have a right to withdraw their consent)?

• Are quality assurance procedures being followed in the laboratories during DNA analysis?

In both systems (that is, those involving the NNDNAD and the NFDPL), DNA samples are collected with the involvement of police, generally without adequate consent. An important safeguard against such practices could be legislation with specific provisions regarding collection without consent and penalties where samples are collected in breach of those provisions. This would be far preferable to a ‘guideline’ or ‘policy’, which is barely adequate in this regard as it lacks an enforcement mechanism. Such legislation should allow DNA collection by police without consent from adult persons where such collection is necessary to assisting in the solution of heinous crimes,1826 even if such DNA sample collection breaches a person’s right to privacy. DNA may serve to link certain persons to particular crime scenes, although conviction for the crime itself may require further evidence.1827 Despite popular confidence in the convicting power of DNA evidence and the generation of unrealistic expectations (even in political circles), the words of the ‘architect of DNA fingerprinting’, Sir Alec Jeffreys, should perhaps be recalled in this regard:

[I]t does not solve crimes. It establishes whether sample X comes from person Y, it is up to the court to interpret that in the context of other evidence in a criminal case.1828

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1826 For example, where two brothers are suspected of raping and then murdering a young woman, or where DNA is found on the casing of explosives.

1827 DNA appears to solve crimes: but often far more evidence is required. For example, in relation to the first of the two previous examples, evidence of the non-consensual nature of sexual intercourse; witnesses reporting screams and the sight of the two men leaving the house. Yet even so, each may argue consensual intercourse and accuse the other of the crime, and say that fear of the other forced their silence.

1828 Cutter, above n 1761.
At the same time, legislation should be in place to ensure that ‘the interference with a person’s rights is not disproportionate to any benefit that might be achieved’ from that collection.\textsuperscript{1829} Such a principle of proportionality may require further definition (perhaps in terms of sentence length for conviction and/or by the nature of the crime committed). Due to the particular vulnerability of children to the possibility of stigmatisation and unintended later impacts due to inclusion on forensic database, if a child’s DNA needs to be obtained for case investigation purposes, it — along with any profile derived from it (see further below) — should be destroyed (or deleted) once the case is decided.

Moreover, where sufficient evidence exists regarding a crime suspect, police should have a right to take samples without consent. However, such non-consensual collection should \textit{not} be applied in case of innocent individuals (such as in regard to witnesses, victims, or for mass screening purposes) nor in relation to those arrested for minor offences. It should be recalled that only collection is here being referred to and therefore the guilt or innocence of accused persons is not yet established; so again a decision regarding sample collection is made on the basis of the principles of proportionality (relevance, propensity, gravity). Where the use of force is inevitable, a transparent and clear witness based procedure must be applied so that people do not feel that there is an abuse of process. If someone refuses to give their DNA sample in circumstances where collection has been made possible by a court order having been obtained, they should be given a warning that such collection is compulsory. However, for the whole collection and analysis process, sample providers should be provided with an information pack containing relevant and sufficiently detailed information (for example, how and why a sample will be collected, its subsequent use, and in regard to the analysis process). In addition, the legislation should provide and safeguard the right of sample providers to withdraw of consent, similar to that provided in Scotland and many European countries as well as in many standard medical research practice guidelines where withdrawal of consent exists.

During DNA data analysis, laboratory quality assurance procedures need to be ensured. Otherwise people’s DNA samples might be mixed up and result in false data that may be used in evidence. Moreover procedures to interpret very small

\textsuperscript{1829} Gene Watch UK, DNA Database and Human Rights, above n 1782.
samples of DNA, or mixed DNA samples also need careful and independent evaluation. Furthermore, adequate data security and privacy policies are critical to ensuring that sensitive private information is not revealed to unauthorised persons during the analysis or processing of such data. Such safety measures should also be applied to the transport of DNA analysis reports to the court or police. Reporting procedures to the police and to the courts need to ensure both privacy and reliability of that report. The scientific officers or analysts concerned also need to understand the limitations of DNA technology, including how and why it can be misinterpreted, and have a clear idea about the DNA profiling system, and how complete a DNA profile needs to be before it can be uploaded onto the database.

(b) Retention of DNA Samples and Profiles

The general perception is that ‘the significant value of DNA retention as an intelligence and evidence tool must be balanced against the incredibly intimate nature of material that reveals so much more than the identity of the person profiled’.1830 It should also be noted that the larger the number of entries of DNA samples and or profiles, the greater the risk of error and abuse. In addition, the retention of DNA ‘in terms of State’s stigmatisation of an innocent person without due process, is anathema to liberalist principles’.1831 A modest respect for the principle of ‘presumption of innocence’ is also required. Therefore, while considering the issue of the retention of DNA samples and profiles the following benchmarks or parameters need to be considered:

- the period for which the profiles/samples should be retained (limited or indefinite);
- the purpose for which the profiles/samples are to be used: for case investigation purposes only or for other purposes, such as medical research and/or for commercial purposes;
- the circumstances in which profiles/samples are to be retained (after arrest, charge or conviction);
- the circumstances in which DNA samples and profiles are to be destroyed when the purpose for which they have been collected has been served;

1830 Sankey, above n 1787, [5].
1831 Campbell, ‘A Rights-Based Analysis of DNA Retention’, above n 12, 890.
• the necessity for security mechanisms or safeguards for DNA data storage and retention; and
• whether such a mechanism or safeguard is to be included in legislation, or only in a policy or guidelines that could be more easily changed.

In regard to establishing such benchmarks, it can be argued that if a person whose DNA has been loaded onto the database is found to be innocent or is released, the DNA sample must be destroyed and the profile should be removed from the database after a set period of time. ‘Liberty’ (the National Council for Civil Liberties), one of the UK’s leading civil liberties and human rights organisations, believes that a limit on DNA retention period can be set through the application of the human rights ‘principles of necessity and proportionality’. There are three principles of proportionality with regards to retention of DNA:

• The relevance or probative value of DNA to the type of crime in question;
• The potential propensity of the trigger offender to future crime of a relevant nature;
• The gravity of both trigger offence and the type of crime feared in the future.\(^{1832}\)

In no circumstances should DNA samples or profiles be retained indefinitely. The period of DNA data retention should, therefore, be proportionate to the gravity or severity of the crime, relevance of DNA evidence collected, and propensity of the criminal concerned to reoffend. Moreover, the premise of the current retention policy — that is, one of ‘just in case’ a person may commit a crime at a future date\(^{1833}\) — must be avoided. Also, ‘[t]he length of retention period should be based on the best available evidence, and such evidence should be actively sought and regularly reviewed’.\(^{1834}\)

Generally, the standard practices of many DNA databases dictate that the DNA sample and/or profile of a person accused but not convicted of specified violent or

\(^{1832}\) Sankey, above n 1787, [6].
\(^{1833}\) Ibid [20].
\(^{1834}\) Montgomery, above n 1438.
sexual offences could be retained for a limited period of time. For instance, under Scottish law police have since 2007 ‘been able to retain DNA samples for up to three years where allegations of serious violence or sexual offence have been made’. Such law also allowed ‘for an extension beyond three years if it is felt necessary’. Similarly, because of the impact of DNA samples on privacy and human rights, some countries, such as Germany, Lithuania, and Belgium have pursued a ‘policy of immediate destruction of DNA samples’ following the creation of DNA profile, while in the case of Sweden, samples have to be destroyed ‘as soon as possible’. This policy aims to protect privacy by preventing the samples from being kept, used or re-analysed, to obtain personal health information. Again, the principle of proportionality should decide whether a DNA sample or profile is to be retained and the duration of such retention.

There are some other factors that need to be considered with regards to retention, such as the sample providers requiring knowledge of how their samples and profiles will be stored and used prior to sample collection; the period for which the sample and profile will be retained; and how they can request the destruction of the sample and the deletion of the profile. By way of contrast, in most cases both DNA sample and profile should be retained after conviction, unless there are exceptional circumstances. Any kind of further use of the DNA sample or profile should be restricted to the prevention and detection of crime. Safeguards also need to be designed to ensure that people who have given their DNA voluntarily during an investigation, do not have their DNA data indefinitely entered into databases and/or retained against their will. If for some reason, their DNA samples or profiles need to be retained, this should only be for a certain period of time, and with proper security mechanisms in place, with such mechanism needing to be included in legislation, not simply in a policy or guidelines. The reason is that policy or guidelines lack an enforcement mechanism and also that can easily be changed (as discussed earlier). In addition where police are empowered to make decisions about DNA retention, such decisions ‘should be amenable to judicial review by an independent body’.

1835 Sankey, above n 1787, [14]. See also Police, Public Order and Criminal Justice (Scotland) Act 2006, s 83.
1836 Sankey, above n 1787, [14].
1838 Sankey, above n 1787, [9].
In regard to the retention of DNA data, another point is that a separate regime for the taking and retention of DNA from children should be followed. That means states must treat DNA samples of minors separately from those of the adults, given special needs of minors in the criminal justice system. This is not to say that DNA samples or profiles of minor offenders cannot be retained in forensic databases, in cases where children are repeat offenders or commit serious offences (for example violent crimes and sex offences), for then their DNA profile could be retained. The legislation must pay specific attention to the particularities of minor offenders, for example by creating a different database for minors, or by establishing shorter retention periods or by destroying their data after completion of its purpose. In cases where it is important for it to be retained, in no way it should be retained in the same database as the DNA data of adults.

(c) Access and Use of Stored DNA Data

Access to DNA samples and or profiles as well as the use of a DNA database must be restricted to a small number of authorised persons. In other words, the access of unauthorised people (including person who wants to infiltrate the system) should be prohibited. Normally, no other third parties should be allowed to access stored DNA samples or data. In this respect, legislation should be passed to define who can access databases containing sensitive DNA data. Such legislation should contain provisions defining and/or restricting the purpose of access and use. In cases of great urgency (such as for crime detection), only police could be allowed to access such material and such access should only be permitted in regard to seeking matches for a profile from a crime scene or for supporting defence or prosecution cases, and subject to the appropriate monitoring mechanism. The idea of forming an independent commission for auditing and testing the robustness of security and access control is highly important. Therefore, while considering the issue of access and use of DNA samples and profiles in any DNA systems or database, the following benchmark or parameters need to be taken into consideration:

- Who should be allowed to access DNA data and profiles (only authorised people or third parties or both)?
- Can the DNA samples and/or database be used for additional purposes (for example, research, commercial) other than case investigation?
Considering the value of the second parameter, normally a forensic DNA database should not be used for any purpose other than the purpose for which it was originally established (that is, crime prevention and detection). Any additional use should only for research purposes, and safeguards would need to be provided for accessing stored data. In this regard, the key issue which needs to be kept in mind is that research on people’s genetic characteristics should not take place without their consent, and any such research ‘should only take place with the express consent of the donors ..., or with completely anonymous ... samples or data along with research ethics committee approval’.1839

(d) Governance and Oversight
With regards to the governance and oversight issue, the important parameter that should be considered is that:

- Is there any independent monitoring and oversight of how the DNA lab or database operates?

An independent oversight as well as the regular publication of public information about the size, costs and effectiveness of the database in helping to solve crimes is always significant for any DNA database. An independent body or commission should be composed of representatives of various bodies or groups: the government, police, scientists, the general public, human rights organisations and an ethics group.1840 It has been recommended that:

Membership of such body or commission must be defined by law and should include people from all walks of life. It must oversee that the database is run satisfactorily. All safeguards regarding the database should be rigorous and assessed by this independent body.1841

In the case of the NDNAD, the National DNA Database Ethics Group should play a more prominent role and have more influence in the legislative process governing

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1839 The Wellcome Trust, above n 1419, [10]. This document is one of the many responses to the UK government’s Human Genetic Commission’s Consultation on the National DNA Database.
1841 Ibid [Recom 3B].
database development.\textsuperscript{1842} For the DNA systems of other jurisdictions, this type of ethics group or an independent body needs to be formed.

Moreover, legislation should contain provision that any kind of decisions regarding collection, retention, access and use of DNA data should be monitored and jointly taken by an independent body rather than being left solely to the discretion of the police. A further oversight issue is closely associated with the retention issue. In circumstances where the retention of DNA is inevitable, neutral supervision and monitoring of DNA systems is thus required. For instance, in the case of \textit{Kruslin v France}\textsuperscript{1843} the recording of an applicant’s telephone conversations on the part of the public authority was an issue and in deciding this case the ECtHR found that where there is state surveillance of an individual, the supervisory control ideally should come from judicial officers.\textsuperscript{1844} Though retention of DNA data and individual surveillance are not similar on the face of it, nevertheless the retention of DNA data could sometimes considered similar to as a means of surveillance, and at times even ‘mass surveillance’ where screening of numbers of persons in relation to an offence is to be undertaken. In order to safeguard the sensitive DNA data as well as to control such surveillance and protect privacy, adequate supervision is required either through judicial involvement or that of independent bodies. As Campbell observes:

\begin{quote}
Retaining personal biological material may not be conceptually equivalent to the State monitoring one’s phone calls, given the greater direct intrusion of the latter; nevertheless, the degree and depth of personal and familial information contained in DNA indicates that judicial or other independent oversight is warranted to safeguard an individual’s privacy.\textsuperscript{1845}
\end{quote}

Careful consideration and adoption of those recommended monitoring principles will ensure human rights and privacy protection. These mechanisms should be applied to both the NFDPL and the NDNAD. The impacts of the use of DNA data and databases on privacy, human rights and justice will always depend on the context in which it operates, that is, on the integrity of the criminal justice system in the country as a whole. Given the resource constraints of developing countries, the introduction of such standards could not be instituted in full ‘overnight’. Implementation would

\begin{footnotes}
\item[1842] Ibid [Recom 5].
\item[1843] \textit{Kruslin v France} [1990] 12 EHRR 547 (Ser A).
\item[1844] Ibid [34].
\item[1845] Campbell, ‘A Rights-Based Analysis of DNA Retention’ above n 12, 897.
\end{footnotes}
be more gradual than could be the case with the NDNAD, and would need to also be accompanied in both cases with suitable training and so forth. Their introduction and enforcement would depend to a large extent on the capacity and resources of the country concerned. In a developing country context, implementation would need to be progressed as rapidly as is possible to maximise effectiveness and ensure greater international cooperation.

7.1.4.2 Sustainable Capacity Building for Developing Countries

The second issue is the technological, human resource and socio-economic discrepancies that exist between developed and developing countries (for example, between the UK and Bangladesh). The selected case studies have highlighted some potential gaps, which could be common to some other jurisdictions of a similar nature (that is, countries that have same socio-economic and legal-political background). For example, in their study, Ungaria and José ‘draw attention to the struggle of some countries to afford centralised DNA databases’. In their discussion, they ‘contrasted the costs of the establishment of a centralised forensic DNA database in the Philippines, with the costs of pressing societal needs — including basic ones such as shelter, food and access to clean water’. That means that the ‘question of the proportionality between the possible benefits of the forensic DNA database and its economic costs in a developing country’ is a ‘crucial and particularly challenging for the governance of forensic DNA databasing’ in the developing and least-developed countries. Given that the Philippines is now considered a ‘newly industrialised country’, the challenge must be even greater for those countries at a lesser stage of their development.

Section 7.1.3.3 of this chapter has highlighted some of the significant challenges facing the NFDPL, though such challenges are not vital issues for the NDNAD. However it is incumbent upon Bangladesh to take measures to ensure sustainable

1847 Ibid 335.
1848 Marchado and Silva (quote) in ibid 334–5.
1849 Ibid 334.
capacity building of the NFDPL in particular, and for the country as a whole. Currently, the Bangladesh government is in the process of creating its own national DNA database that will contain the DNA sequence of convicted criminals along with their criminal records as well as the records of samples found at crime scenes. Though this laboratory is currently funded by the Danida, the process of managing this laboratory on a sustainable basis should start now as international funding is anticipated to end as soon as 2016, and the future of a national DNA database can only be ensured by its being included in the government’s budget. The NDNAD can be a good model for the NFDPL, despite their being from two different socio-economic, legal-political backgrounds, and representing two different situations. In many instances, the NDNAD maintain good practices and can be identified as a sustainable forensic DNA database. The NFDPL can learn and adopt gradually some good practices from the NDNAD. At the same time, the country should be aware of some practices of the UK government that are subject to much criticism (such as the indefinite retention of DNA of persons who have not been convicted of any crime). In regard to the recommendations below, the recommendations could be particularly useful for the Bangladesh DNA system, whilst others could be useful for both the systems — the NDNAD and NFDPL. In general, forensic DNA databases in all countries could benefit from the following recommendations.

(a) Education and Training
In the case of the NFDPL, it is highly important that all stakeholders including the government, all service providers (for example, police, lawyers, judges, magistrates), and the general public well understand the role of and the necessity for DNA technology. As part of this process, service providers should be trained and educated about DNA technology, its use/misuse, and the possible threats to human rights and privacy that this technology poses in the context of the justice delivery system. Particularly ‘police officers, as part of the initial training, should be extensively trained and educated on policies’ concerning forensic DNA systems and a future national DNA database in Bangladesh. Police forces also need more

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1851 Washington … concludes that “the public must be informed and invited into the conversations and policy dialogues …” [A]uthors in this volume [also] call for more education about forensic DNA technologies for jurors (chapter 4) and defence lawyers (chapter 10). In addition, Hindmarsh (Chapter 13) deems necessary more robust and balanced media coverage of forensic DNA technologies in contributing to the debate …’, Prainsack and Hindmarsh, ‘Beyond Borders’, above n 1846, 337.
1852 Murtuja, Adris and Ahmed, above n 1840, [Recom 11].
education about human rights and privacy issues. There should also be ‘an independent agency to regulate and monitor the procedures of collecting DNA’ which procedures in regards to crime scene collection should only be conducted by ‘specially trained police officers’. Once people are aware of this technology, the proper forensic use of DNA information in the justice delivery system of a developing country like Bangladesh will be ensured

(b) Awareness Building

As Murtuja, Adris and Ahmed observe in their 2008 citizens inquiry into the NDNAD, a ‘nationwide public awareness campaign’ is much needed, one that is comprised of ‘just the facts’ and having ‘no bias’, and focusing on a number of key areas, including the nature and use of DNA samples and profiles, the broader implications of DNA, an accurate knowledge of the legal criteria for being subject to sample collection, legal provisions for sample use, for prevailing retention policies, as well as the actual logistics and procedures involved. It will help the public to take ‘informed decision’. Despite differences in their systems, it is imperative that such public education and awareness programs are conducted both for the UK and Bangladesh DNA systems. Moreover, ‘scientists should be much more involved in [such] education’ and their involvement and the education programme will help people to ‘understand more about DNA and ... raise public awareness’ more generally. The concept of genetic privacy in the collection and use of DNA information is new for Bangladeshi society. There needs to be a forum that will allow voices to be raised in regard to the protection of genetic privacy. Some people are already started to think about issues related to genetic privacy and these people have begun some research as well as started to communicate their thoughts in different national as well as international media and fora. Extensive research and media campaigns are essential to build a greater common awareness. Joint efforts by government, civil society and members of the general public will facilitate human rights and privacy protection. In general, as Hindmarsh and Prainsack have observed,

\footnotesize
1853 Ibid [Recom 12].
1854 Ibid.
1855 Ibid [Recom 1].
1856 Ibid.
1857 Ibid [Recom 17].
1858 Ibid.
‘one of the biggest challenges will be building and maintaining public trust’.\textsuperscript{1859} Accurate communication of a person’s rights and responsibilities in circumstances where DNA sampling is required can help maintain the necessary public confidence. Strict maintenance of the integrity of the system and its administration in both developed and developing contexts is also clearly required. Washington has also urged ‘better public education and awareness concerning DNA forensics, which is a necessary prelude to a wider public policy debate’ of the issues involved.\textsuperscript{1860}

(c) \textit{International Collaboration and Cooperation}

The concept of ‘development co-operation’ means and includes but not limited to:

- \textit{financial assistance}
- \textit{technology transfer}
- \textit{infrastructures building}
- \textit{developing expertise}
- \textit{framing national legislation}.

There is some collaboration and interaction between the NFDPL and DNA systems of a few neighbouring countries, such as the Philippines, India, and Malaysia.\textsuperscript{1861} Nevertheless some international collaboration and cooperation with regard to DNA technology between Bangladesh and countries or international bodies, other than Danida, is significant.

A lack of development co-operation, co-ordination and data-sharing between developed countries and Bangladesh would hamper the progress of the NFDPL system. Moreover, if all DNA facilities or service systems are not of an equal standard to those around the world, it would not be possible to build a common standardised forensic DNA database and to share data in order to detect international terrorists and heinous criminals. The NFDPL has international significance and this laboratory plans to establish a National DNA database and also to establish a link with the international criminal police organisation (INTERPOL). Regarding this issue, one of the interviewees highlighted that there is no development agreement

\textsuperscript{1859} Hindmarsh and Prainsack, ‘Introducing Genetic Suspects’, above n 24, 2.
\textsuperscript{1861} R 2.9.
between Bangladesh and other developed countries or international bodies for a DNA database of a standard equal to those in developed nations (who might later wish to access its data, for example in relation to transnational criminals).\textsuperscript{1862} However ‘there is regular association with an Indian laboratory, namely the Centre for DNA Fingerprinting and Diagnostics (CDFD)’.\textsuperscript{1863} R1 is hopeful that:

Once our database is established then we have a plan to build relations with FBI, INTERPOL. The pioneer organisation in this field is the Forensic Science Service (FSS) of the UK. We also have a plan to contact the FSS.\textsuperscript{1864}

The role of Bangladesh Police in the arrest of a number of notorious international criminals is recognised. A DNA database will assist this process. For example, there are some ‘extremists [who] stay in disguise in different countries’, and the NFDPL has the potential ‘to identify them quickly’.\textsuperscript{1865} If there is a good co-operation and a data sharing relationship with other countries, then DNA samples or DNA profiles stored in the database could easily be checked against that of persons arrested, perhaps on suspicion of illegal activities. In this regard, section 45 of the proposed ‘\textit{Deoxyribonucleic Acid (DNA) Act 2010 (draft)}’ of Bangladesh provides that, with the approval of the government, the proposed national DNA database of Bangladesh will supply the necessary co-operation, co-ordination and data-sharing with the international law enforcement agencies (such as INTERPOL).\textsuperscript{1866} Therefore, the NFDPL or the proposed national DNA database of Bangladesh ‘is essential to expose [it to] the international standards of similar bodies’.\textsuperscript{1867} Once the database builds links with other countries and/organisations, then its scope of activities will also be increased. All these facts lead to a recommendation that the national DNA database should start to work for the Bangladeshi justice system without delay. In order to fulfil this objective, a high quality and coherent development co-operation program is required to facilitate the necessary sharing of data and knowledge.

Moreover, observations should be made of the type of regional co-operation that already exists and how that operates. Within the EU, for instance, regional

\textsuperscript{1862} R 2.8–9.
\textsuperscript{1863} R 1.4.
\textsuperscript{1864} R 1.4. The rapidly changing situation in the UK may render this difficult; however, relevant personnel and bodies would be able to be identified and contacted.
\textsuperscript{1865} Raza, above n 1492.
\textsuperscript{1866} \textit{Deoxyribonucleic Acid (DNA) Act 2010 (draft)}.
\textsuperscript{1867} Raza, above n 1492.
cooperation already exists for which ‘the EU itself provides funds [including] for the Standardisation of DNA Profiling in the European Union (STADNAP) to ascertain best practices capable of facilitating increased data sharing across criminal jurisdictions’.\textsuperscript{1868} The UK government is also committed to the “technological harmonisation” of forensic DNA databasing across the EU.\textsuperscript{1869} The European DNA Profiling Group (EDNAP) has also supported the ‘need for harmonisation of [the] technical and legal issues at the European level’, although there are ‘considerable heterogeneities’ among the European countries with regards to the ‘cultural, political and legal’ matters’.\textsuperscript{1870} This kind of regional co-operation needs to begin in other parts of the world and could be a primary step on the way to building a common DNA database standard for all.

Currently no international regulatory framework exists to create common standards for the content and use of forensic DNA databases so as to provide respect for human rights and privacy, as well as ensuring national security. Hindmarsh and Prainsack raised their concerns that:

In the next decades, the use of forensic DNA databases will increase in breadth and scope at national, transnational and international levels. Moreover, the importance and use of DNA profiling and databasing will increase and broaden with the rise of security, biometrics and anti-terrorist issues on public and political agendas. Parallel to such expansion, which is also occurring in developing countries, will be an increasing need to balance the benefits of the new genetic technologies of identification, surveillance and security against civic concerns, informed by criminal, genealogical and, potentially, medical and health histories, and new shifting definitions and identities and stakes pertaining to the criminal and the suspect.\textsuperscript{1871}

An international effort is therefore vital to ensure that some relaxed country practices or national standards for DNA databases should not become the international norm. Rather where there should be an international DNA database agreement that should be signed between countries which provides clauses on safeguards, security and how the database and related information should be used.\textsuperscript{1872}

\textsuperscript{1868} Robin Williams, \textit{Forensic DNA Databasing: A European Perspective} (June 2004–May 2007) Durham University <http://www.dur.ac.uk/robin.williams/eu.html>. See also section 2.1.5 (European Region) of Chapter 2.

\textsuperscript{1869} Ibid.

\textsuperscript{1870} Ibid. See also section 2.1.5(European Region) of Chapter 2.

\textsuperscript{1871} Hindmarsh and Prainsack, ‘Introducing Genetic Suspects’, above n 24.

\textsuperscript{1872} Murtuja, Adris and Ahmed, above n 1840, [Recom 10B].
7.1.5 THE WAY FORWARD

The journey of this study that began with the research questions which have been addressed and argued in all chapters of this thesis are now resolved. This is not the end, because there are not ever really any beginnings, nor any ends. At the end of this research journey, some new issues have been discovered which generate enough scope to pursue other avenues of investigation, and such issues actually laid a foundation for other research in this area — the use of forensic DNA databases for law enforcement purposes are expanding at an alarming rate worldwide. According to the report of the Council for Responsible Genetics, at present some ‘56 countries operate national DNA databases from Asia to Europe and the Americas’. Over time this number will increase gradually. Among them ‘some are still in their infancy, while others (eg those are in the US and the UK) are large, highly sophisticated and have been established for at least fifteen years’. Another factor which leads to the rapid growth of these forensic DNA databases is that ‘in a post 9-11 world, law enforcement and national leaders have become increasingly concerned’ about international terrorist activities and other kinds of global crimes (such as, illegal immigration). As Hindmarsh and Prainsack have observed, ‘[T]he current trend towards an expansion of the scope and uses of DNA databases for police and forensic purposes is now attracting increasing discussion and can meet different levels of public concern in different countries’. These authors also noted that:

There is great variety in the ways in which forensic DNA databases are set up, managed and monitored … there is also considerable variety among countries in the public and regulatory discourses that preceded and accompanied the establishment of national forensic DNA databases — a process that is still ongoing in some countries — or the discourses that relate to new development.

Countries, therefore, do feel the urgency for sharing data regarding criminal records (including DNA data) across their borders, which has led for instance, to regional data-sharing agreements (such as the Prüm Treaty which has been established in the

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1874 Thibedeau, above n 26.
1875 Ibid 17.
1877 Ibid.
European Union. A range of organisations are currently involved in developing and promoting DNA databasing across the EU, including

EDNAP, [which] has existed since 1988 with the aim of establishing systematic procedures for data-sharing across the European community; the STADNAP group [which] exists to promote co-operation across the EU in order to utilise DNA profiling to detect “mobile serial offenders”; and the ENFSI [which] has similar ambitions to standardise forensic practices in support of policing across the whole of the EU.1879

Furthermore the International Centre of the National Institute of Justice’s (NIJ) of the USA promotes ‘international access to information about transnational crime’.1880 In addition, INTERPOL’s DNA database now contains profiles shared by 54 countries.1881 Although technological harmonisation has increased the scope of data sharing, it has also raised concerns regarding the misuse of transnational DNA data. DNA data is shared across borders with little oversight. This is also a big threat for the national security for the countries concerned. These kinds of data sharing practices, especially with regards to sensitive information like human DNA, pose additional threats to human rights, privacy and democracy worldwide. These threats are further ‘heightened by the growing effort to link all these databases into one international database’.1882

As Bautista observes,

There is always a fragile balance between obeying international law and maintaining sovereign autonomy. Especially from a political standpoint, the leaders of a country are not always keen to lose face with their fellowmen for acts that may be interpreted domestically as treasonous or un-nationalistic even when such policy shifts mean bringing the country’s policies into line with international norms.1883

National leaders tend to sign conventions and treaties in a way that suits their domestic situation. Thus a country may enter reservations for a convention to ensure

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1878 Justice and Home Affairs European Parliament, above n 1385.
1879 Williams, Forensic DNA Databasing, above n 1868.
1882 Thibedeau, above n 26, 17.
that it is compliant with social mores or religious belief and/or practice. They do so, sometimes not to lose their political positions inside the country, or sometimes just to
direct national regulation in a particular way. Countries do not readily want to enter a
regional and/or international regulatory framework that may involve onerous compliance obligations and extensive change on their part (for instance, initially the UK\textsuperscript{1884} did not want to join the \textit{Prüm Treaty}).\textsuperscript{1885} Therefore, at least in some cases, countries do not readily accept the treaty or convention; rather they enter one or more reservations when they become signatories to that instrument.\textsuperscript{1886} Even when a
country is a signatory to a relevant convention, ensuring compliance may be fraught
with problems, not the least a lack of enforceable sanctions. It is always a big challenge to make countries uniformly observe any regional and/or international incurred.

In order to adopt a common DNA database standard for all countries and to regulate
international DNA data sharing practices across the borders, several efforts are currently underway. Most notably, the CRG report\textsuperscript{1887} represents a first step toward addressing and tackling the issues related to international DNA data sharing practices. It actually signifies the existing scenario regarding the global growth of DNA databases and human rights issues. This report mainly focused on each
country’s practice regarding DNA databases (covering its law on a number of points, including sample collection, entry criteria, removal criteria, sample retention, and
database access). However, the way in which countries around the world will equally implement international DNA data sharing practice and rule in their national
jurisdiction still remains unclear. Moreover, information resources are also a

\begin{itemize}
\item \textsuperscript{1884} Digital Civil Rights in Europe, above n 1384.
\item \textsuperscript{1885} \textit{Convention on the Stepping Up of Cross-Border Cooperation, Particularly in Combating
Terrorism, Cross-Border Crime and Illegal Migration} [2005] OJ C 71/35, which is popularly known
as the \textit{Prüm Treaty}.
\item \textsuperscript{1886} 'On the 6th of November 1984, Bangladesh ratified \textit{CEDAW} with reservations on Articles 2, 
13.1[a], 16.1[c] and [f] …, on the basis of religious sentiments': Asian Women's Resource Exchange
(AWORC), 'CEDAW and Women: The Bangladeshi Experience' (March—June 1998) 1(3)
\item \textsuperscript{1887} 'The Council for Responsible Genetics (CRG), GeneWatch UK and Privacy International have
joined together in a groundbreaking project that seeks to achieve a direct impact on the human rights
standards adopted for DNA database legislation across the world. For this purpose Council for
Responsible Genetics and the GeneWatch UK have created new information resources that outline the
global growth of DNA databases and human rights issues implicated by their dramatic expansion',
Jeeg, \textit{CRG and GeneWatch UK Issue: New Resources on Forensic DNA Databases} (13 January 2011)
Council for Responsible Genetics: Genetic Watchdog,
<http://www.councilforresponsiblegenetics.org/blog/post/CRG-and-GeneWatch-UK-Issue-New-
Resources-on-Forensic-DNA-Databases.aspx>.
\end{itemize}

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potential site for abuse as well as for reform.\textsuperscript{1888} This report did not confine its scope to those countries where DNA technological facilities are common, but also tried to focus on the developing world ‘where policy and practice are un-fixed’\textsuperscript{1889} and in some cases inconsistent as well.

International data sharing practice, undoubtedly, is a wonderful mechanism to detect heinous criminals as well as a tool to lessen international terrorism; however, that mechanism needs to be applied in such a manner that it will ensure the proper use of DNA data sharing across borders. It is now important to conduct some research on whether the proper use of DNA data sharing could be ensured through an international regulatory framework and, if so, what should be the nature and scope of that framework; and, to what extent, could countries be made equally obliged to abide by such a regulatory framework. This is because countries do not have a common standpoint regarding the sharing of DNA data across the borders. Furthermore, many developing and least developed countries do not have equal footing and capacity to fulfil any international convention or treaty to the same extent as developed countries that have a greater capacity to apply such advanced technology. If international regulation is proved not to provide a better solution, then further research could be undertaken to look for alternative mechanisms for ensuring the proper use, access and sharing of DNA data across borders. Such an alternative mechanism may or may not be a substitute for that international regulatory framework. I believe that solutions to such issues need to be researched for the above-mentioned reasons.

7.1.6 CONCLUSION

Developments in the DNA field continue apace. It has been acknowledged that in this regard, ‘[s]cience and technology have certainly come a long way … standard turn around times — from crime scene exhibit to DNA profile — have gone down from three months to three weeks to three days’ in the period from 2001.\textsuperscript{1890} Forensic scientists are also ‘currently working on developing a portable kit the police could use to get a rough profile (with a one in a million chance of a match) at the crime

\textsuperscript{1888} For example, DNA of a person targeted for political reasons could be shared as if that DNA were that of a ‘criminal’.
\textsuperscript{1889} Thibedeau, above n 26, 18.
\textsuperscript{1890} Jones, above n 1485.
scene within an hour. It has also become possible to generate profiles from ever smaller or more degraded DNA samples.\textsuperscript{1891} DNA technology has much potential — Hindmarsh and Prainsack identified this technology as ‘a new language of truth’ and also argued that ‘forensic DNA profiling and databasing provide simple solutions to complex problems’.\textsuperscript{1892} It is a crime prevention tool that was originally intended only to identify the most dangerous convicted felons on a case by case basis. However, DNA collection and analysis are also conducted in regard to innocent people and there is a widespread practice of retaining such data for a considerable period of time.

In addition, DNA data is now routinely being used for a multiplicity of purposes that pose significant human rights and privacy concerns for every citizen and their families. DNA differs greatly ‘from other methods of identification such as fingerprinting; it is a window into an individual’s medical history and that of their entire family’.\textsuperscript{1893} DNA records are routinely linked to other computer records, such as records of arrest, which can be used to refuse someone a visa or a job or otherwise discriminate against them. A ‘very serious threat’ to human rights and privacy in a democratic society is posed by the permanent retention of DNA samples, whether these are from ‘individuals who have never been convicted of a crime’ or from those caught up in ‘DNA “dragnets” devoid of individualized suspicion’ when the storage and use of such information is combined with ‘weak safeguards’.\textsuperscript{1894} Essential safeguards — including legal restrictions on the circumstances in which DNA and associated information can be collected and retained — need to be in place.

Global governance of forensic DNA profiling and DNA databasing was examined by a number of authors in a 2001 volume edited by Hindmarsh and Prainsack. It undertook ‘[a]n investigation of the emergence, implications and governance of forensic DNA profiling and databasing’,\textsuperscript{1895} with a view to exploring the

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{1891} Ibid.
\item \textsuperscript{1892} Hindmarsh and Prainsack, ‘Introducing Genetic Suspects’, above n 24, 1.
\item \textsuperscript{1893} Thibedeau, above n 26.
\item \textsuperscript{1894} Ibid.
\item \textsuperscript{1895} Hindmarsh and Prainsack, ‘Introducing Genetic Suspects’, above n 24, 3.
\end{enumerate}
\end{footnotesize}
countries that display different stages of development of forensic DNA databases … rang[ing] from the highly developed practices of the UK … to the emergent ones.\textsuperscript{1896}

Similarly, this thesis will more specifically consider the developed/developing country context of forensic DNA databases, and with this view two case studies (of the UK and Bangladesh) have been conducted. This chapter contains the findings from these case studies and the subsequent comparative analysis of those findings. Both the NFDPL and the NDNAD are significant police investigative tools for their respective countries. However, at present both these DNA facilities pose some risks and challenges, some of which differ in nature or extent, while others are common to both. For ensuring human rights and privacy protection, some mechanisms have been suggested by section 7.1.4 of this chapter. The application of these benchmarks is required at different levels in the NDNAD and the NFDPL depending upon their priorities and capacity. In order to reduce gaps between developed and developing countries, the sustainable capacity of Bangladesh (a developing country) for smoothly running the NFDPL needs to be increased. At the same time, some development co-operation should be provided by the developed countries (including the UK) to improve the NFDPL and its operations. This way the NFDPL will meet the necessary requirements to achieve an internationally accepted level, which will ultimately enable it to contribute to international DNA data sharing to combat international terrorism and global crime.

\textit{S and Marper} is a landmark decision for protecting human rights and privacy while using DNA information in the justice system of all countries that run DNA services, including UK and Bangladesh. This is because it provides a necessary reminder that privacy is a fundamental right that sets limits to what states can do in the area of combating crime. The guiding principle decided by this case should not be used to unnecessarily obstruct law enforcement. Sufficient scope is always kept for states to pursue important interests of national security and public safety, and the prevention of disorder as well as crime. However, state legislation should be more finely

\textsuperscript{1896} Ibid. The ‘emergent systems’ examined were those of the Portugal and the Philippines. Machado and Silva in their analysis considered the former a ‘developing’ country — but only in ‘a European context’ (in ch 11) (and it is certainly not considered a developing country by the International Monetary Fund); while Ungria and José examined the experience of the Philippines, a developing country, but it is one at the upper range (in ch 15).
‘nuanced, and … not give blanket powers to investigation authorities that affect many more citizens [particularly their individual right to privacy] than necessary in a democratic society’.1897 There should be a proper balance between individual human rights and state security measures.

To conclude it can be said that in light of the discussion provided, data collected, analysis performed and argument presented in this thesis, there is scope for the consideration of human rights and privacy violations in the forensic use of DNA information. Such privacy interest, however, needs to be protected while keeping a balance between human rights, individual privacy and the public safety and state security measures. It can be argued, similarly to the view of Michael Boylan:

>[P]olicy parameters [should] balance the police’s legitimate interest in using the latest technology to solve crimes while protecting the rights of the innocent, the presumed innocent, and the guilty. Such protections are necessary because efficiency is not the only goal in criminal investigation. We must never forget that all social institutions should exist within the context of justice.1898

Moreover, there should be greater development co-operation between and among countries around the world; this could be in terms of financial and/or technological assistance or sharing of DNA data or knowledge. It is anticipated that the recommendations provided in this research will be instructive in advancing human rights and genetic privacy protection both for the NDNAD and the NFDPL and, if adopted, contribute to a lessening of the discrepancy between developed-developing countries. These recommendations could work at the level of national jurisdiction at first instance as well as globally, as this crisis is not only a matter of international affairs but also primarily a matter of the domestic realm. It is also expected that the research methodology adopted and findings will provide a useful model and insight into further research analysis in this area. Finally beyond the scope of this thesis, it is to be hoped that the analysis presented in this thesis will play a role in facilitating future exploration of issues relating to international DNA data sharing, national sovereignty and a country’s international obligations.

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1897 Koops and Goodwin, above n 1477.
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APPENDIX A

R1, Management level staff, NFDPL, Interview Date 26/08/2010, 10:30 am

1. What is the organisational structure of this laboratory? Please provide me information about staff hierarchy.

The Lab head is the top position in the National Forensic DNA Profiling Laboratory (NFDPL) and all other staff members (that is scientific officers, lab technicians and others) work under his or her direction. Under the position of the lab head, there are some posts for the scientific officers. Below that position, there are some posts for the lab technicians. At the bottom of that hierarchy there are some posts for the computer operators, receptionist, cleaner and other staff. Though there is a hierarchy, we all work in this lab as a team. We are appointed by the Bangladesh government under the multi-sectoral programme on violence against women (MSP-VAW) project. Our appointment is temporary (that is for the project period). After the completion of each phase of this project, our appointment is renewed along with the renewal policy of the project.

2. What kinds of service do you provide?

This lab provides various kinds of services, such as, paternity testing, relationship proof, dead body and/or disaster victim identification, immigration disputes, identification of rapists and murderers and so on. That means our lab provide services for all kinds of disputes where the identity is an issue.

3. What are the objectives of this lab?

The main objective of this lab is to assist the Bangladesh justice delivery system. Many sexual offences occur daily but those cases cannot be proved due to a lack of evidence. Now with the help of DNA testing, it is possible to detect the actual offenders. Initially it provides services for the rape victims; at present the scope of its services has been expanded.

4. Which level of staff is responsible for collecting DNA sample?

Each and every case is assigned and handled by a team comprising one scientific officer and one lab technician and they are supervised by the NFDPL head. There are two
methods of sample collection, firstly, samples are collected directly from the body of 
sample providers (victim or suspect) who come in the lab with the IO, and secondly, 
samples are also collected from the crime scenes. Such collection is mainly conducted by 
the police. There are five divisional DNA screening labs and police collect samples from 
the crime scene of peripheral regions and send these collected samples to the nearest 
DNA screening lab. In order to cover the whole Bangladesh such kind of divisional 
service system has been established. The lab staff do not collect sample from the crime 
scenes.

5. **Do you have an approved policy governing the collection of DNA samples?**
   Our lab does not have any policy as such. But there is a working manual for guiding our 
   activities (including sample collection procedure)

6. **Do you retain DNA samples?**
   Yes. We retain both DNA samples and profiles.

7. **Do you retain DNA data?**
   We retain DNA analysis results or profiles both in the paper based files as well as in the 
   computer.

8. **If yes, what is the maximum period of data/sample retention at the NFDPL?**
   We retain DNA samples for one year and DNA profiles for an indefinite period of time.

9. **Is there any legislation or approved policy framework to govern this lab?**
   The proposed draft DNA Act 2010 is under review. At present DNA tests are accepted in 
court as ‘scientific evidence’ under the Evidence Act of 1872. Therefore until now court 
is using DNA evidence with the interpretation of some existing legal provisions, for 
instance, s 45 of Evidence Act and s 510 of Code of Criminal Procedure. These 
provisions are not, however, the direct basis for accepting DNA evidence in the court. 
They are only widely interpreted to include DNA evidence in the judicial process so that 
any future dispute with regard to the use of DNA evidence can legally be justified.
10. **Do you have privacy policy for this Laboratory?**

At present this lab does not have any privacy policy. Once the proposed DNA Act will be enacted, then government will formulate related policies and rules under this umbrella law gradually and on need basis.

11. **Is there any supervisory body for this lab?**

There is a supervisory body for the NFDPL and this is called DNA Executive Board. The Board supervises all activities of the NFDPL. The Board also convenes a meeting to review activities of the NFDPL twice a month.

12. **What kinds of assistance do you receive from funding body (Danida), financial/technical/training and development/other?**

Danish International Development Agency (Danida) provides all financial and technological support, equipments, training and all other costs for successful running of this lab. Though Danida is funding this lab, there is a substantial involvement on the part of the Bangladesh government. Other physical supports (such as office space, and other logistics supports etc) are provided by Bangladesh Government.

Depending on the necessity, there is scope for the training of the lab staff. Moreover, regular training session and workshops are organised for the judges, public prosecutors, lawyers, police officers, magistrates, forensic doctors and those who are related to the service of DNA technology. Training costs are mainly borne by the Danida.

13. **Who are the primary customers of your services?**

At this moment judiciary, law enforcing agencies, embassies are main consumers. Sometimes some agencies of the government in case of urgency sent request to us (normally via court or law enforcement agencies) for DNA testing. For instance, in case of Bangladesh Rifles (BDR) insurgency or revolution, BDR officials seek help to the NFDPL to identify the dead bodies of some of the missing army officers. This request came to our lab as a special case. Generally no private request is entertained in our lab. If we are allowed to entertain private cases, it might corrupt the whole system and there will be no transparency as well as a lack of checks and balances.
14. Can any government authority or funding body access your lab?

Government departments or funding bodies cannot access the lab. Only the court or the police can seek the DNA analysis report. In the interest of a case investigation or justice, if law enforcing agencies feel necessity then they can visit the lab and can collect some more information related to the case, but they need to come with proper channel and with just cause. This access must be supervised by our lab staff.

Until now the law enforcing agencies have not expressed much interest in accessing the lab. Apart from that, we have not established the DNA database yet. Once the database is established, then the authority will decide who should have right to access it and who should not.

15. How important do you consider this laboratory in justice delivery system of Bangladesh?

It is very important for the justice delivery system, before establishment of this lab; it was difficult to detect the actual criminal. It is actually assisting victims of different heinous crimes (such as rape, murder etc) in order to get justice.

16. Is there any development co-operation between Bangladesh and other developed countries for better management and functioning of this lab?

At present the Danida is providing their financial assistance. Moreover there is regular association with an Indian laboratory, namely the Centre for DNA Fingerprinting and Diagnostics (CDFD). Other than this cooperation and assistance, this lab does not have any development co-operation or relationship with any international body or country. Once our database is established then we have a plan to build relations with FBI, INTERPOL. The pioneer organisation in this field is the Forensic Science Service (FSS) of the UK. We also have a plan to contact the FSS.

17. What are the key challenges NFDPL facing at this moment?

The first challenge is public feelings and opinion about this new technology, for instance the general public is suspicious about the quality of DNA testing. There is also much corruption in Bangladesh, consequently, the general public have a lack of trust in the state
bodies involved with the new technology. Some people also think if the DNA testing is conducted within Bangladesh, then the quality of the test would be poor. They prefer to send the sample to do analysis in any foreign country’s laboratory. There is also lack of awareness among them.

Judiciary and most of the judges are not familiar with this new technology. Some of the judges are rigid to accept this new technology. There is also lack of skilled personnel in Bangladesh. It is a big challenge on the way of creating awareness among general people about DNA technology as well as it use with small number skilled personnel. It will take time. At present there is also lack of knowledge among the law enforcement agencies how to collect DNA samples without losing its evidentiary value. But situation is gradually changing. The use of DNA profiling is spreading. The progressive-minded legal professionals and law enforcement agencies are willing to explore this field and the unlimited possibilities it holds.

18. What is the Future of this lab?

After finishing the current phase of the MSP-VAW project, there are two options, either it will be come under Bangladesh government revenue budget, or the Danida might renew it for another phase. Under the current arrangement with Danida, the project is going to extend for another three years which means it will enter in its fourth phase until 2013.
1. **What is the organisational structure of this laboratory? Please provide me information about staff hierarchy.**

Under the current set up, the laboratory head is the highest position. After that post, there are some posts for the scientific officers. In order to assist these scientific officers there are some post of the lab technicians. Apart from that there are some posts for computer operator, cleaner, front desk officer or receptionist.

2. **What kinds of service do you provide?**

This lab provides services for identification of rapists and murders, paternity testing, sibling testing, dead body identification and/or disaster victim identification, immigration disputes or any other cases where identity of someone is an issue.

3. **What are the objectives of this lab?**

On 23 January 2006 the NFDPL was established under the MSP-VAW project, which has been funded by the Danida. The Danida provides financial and technical assistance all over the world under a component of ‘human rights and good governance’ and there is a sub-component namely, ‘access to justice’ and the MSP-VAW is under this sub-component. The NFDPL is established with an objective to assist and to provide legal support to women victim for various offences, especially sexual assaults. Later scope of its service has been extended. Now the services of this laboratory are not confined only to get justice for victimised women for various offences. At present it is supporting the whole legal system of Bangladesh.

4. **Which level staff members are responsible for collecting DNA sample?**

Scientific officers and lab technicians are mainly involved in the collection process. However, all their activities need the approval from the lab head.

5. **Do you have an approved policy governing the collection of DNA samples?**

There is a project document or project proforma. At present however, there is no policy governing the DNA sample collection.

6. **Do you retain DNA data?**
7. **Do you retain DNA samples?**
   Yes. We do.

8. **If yes, what is the maximum period of data/sample retention at the NFDPL?**
   We retain both DNA samples and DNA profiles. We retain DNA samples for one year and DNA profiles for indefinite period of time.

   DNA data or analysis results are retained both in the paper based files as well as in the computers as electronic version. DNA Samples are retained for 6 months. Now our lab has limited capacity, once its capacity will be increased, then we will consider about the exact duration of sample retention.

9. **Is there any legislation or approved policy framework to govern this lab?**
   At present there is no particular legal basis as such. Therefore the court cannot force any person to undergo the test because of a lack of legal basis. Currently DNA tests are accepted in court on the basis of the Evidence Act and Code of Criminal Procedure. Sometimes legal opinion from the ministry of law, justice and parliamentary affairs, of the government of Bangladesh is also taken. The necessity for the comprehensive law has already been felt, and an inter-ministerial meeting and a national consultation was held on the draft law. Now the final draft – the ‘DNA Act 2010’ is under review in the Ministry of Women and Children Affairs.

10. **Do you have any privacy policy?**
    There is no written privacy policy for governing this lab. However through practice it is maintained that DNA data should not shared with anybody except the investigating officers or the court.

11. **Is there any supervisory body for this lab?**
    There is a supervisory body for the NFDPL and it is called the DNA Executive Board (DEB). How the lab works, how samples are collected and what the DNA database looks like, the accountability of the lab etc are monitored by this Board. That means all functions of the lab are monitored by the DEB. Every activity of the lab has to be reported to the Board. When there is any new activity of the lab, the Board calls a
meeting. Reports of regular day to day activities are not required to be submitted to the Board.

12. **What kinds of assistance do you receive from funding body (Danida), financial/technical/training and development/other?**
   The Danida provides its assistance with regards to financial and technological matters.

13. **Who are the primary customers of your services?**
   At present mainly court, police and some embassies are the main users of this lab. If any government or non-governmental department or its authorised person wants to request for DNA testing, such body is required to apply via court. We do not allow private request. Such practice allows us to maintain good checks and balances in our system. Besides, if there were an undue number of cases, it would be difficult for us to handle and provide accurate DNA results.

14. **Can any government authority or funding body access your lab?**
   No other third party including government body can access DNA data stored in this lab. Only the lab head and scientific officers are allowed to do that.

15. **How important do you consider this laboratory in justice delivery system of Bangladesh?**
   With the assistance of this technology, cost of appeal, review or revision, and unnecessary costs for the disputant parties have minimised dramatically. That means it helps to reduce the case related cost of the government as well as for the parties. Moreover this remarkable technology provides exclusion as well as positive identification with virtually 100 per cent accuracy.

16. **Is there any development co-operation between Bangladesh and other developed countries for better management and functioning of this lab?**
   There is no development agreement between Bangladesh and other developed countries or international bodies (such as the INTERPOL) for an equal standardised DNA database. But some kind of data sharing or cooperation with some international bodies or developed countries is important, as it will expedite the regional and inter-country DNA data sharing relationships in order to detect some international terrorists or transnational
criminals However, there is some connection of the NFDPL with the DNA systems of a few neighbouring countries, such as the Philippines, India, and Malaysia.

17. **What are the key challenges NFDPL facing at this moment?**
   Lack of cooperation and co-ordination on the part of the service providers (police, courts and lawyers) is one of the biggest challenges. The success of DNA testing and the lab depend on the co-operation of the police, the court and the lawyers. If judges are positive about this new technology, then the success rate would be very high. They can even motivate ordinary people, because ordinary people have a huge faith in the judiciary. But if the sitting judge thinks that he will not consider the evidence, then it is useless. Besides, disputing parties and their lawyers need to feel that DNA testing is necessary to obtain justice, and they then need to convince the court and seek permission for the DNA test in the particular case. If lawyers are reluctant because they do not understand this new technology, then the whole purpose will be frustrated.

   Besides, some judges, magistrates, and lawyers and police do not have science background. At this moment many of them do not understand what is DNA and DNA profiling and how it works. Over the period of time when people will know about this technology more and more, then all parties related to the case including judges and lawyers will readily accept the DNA test report or evidence. But in order to make them aware, we regularly organise training programs, seminars and workshops for the judges, lawyers, police, magistrates, forensic doctors. Another issue is that general public is suspicious about this technology. There is a government fund for the poor victim. But most of the ordinary people do not know about the fund. Besides, some human rights organisation, or the NGOs provide their assistance towards the poor victims. But most of them (poor victims) do not know how to get these funds. In addition we have lack of professional skill at this moment.

18. **What is the Future of this lab?**
   The NFDPL needs to be independent without any control from the part of government or other body. Before getting it autonomy, the lab needs to have a constant source of fund or financial stability. This is because after running out the Dandia funding, there is no alternative source of fund for this lab.
R3, Scientific Officer, NFDPL, Interview Date 29/08/2010, Time 10:20 am

1. Are you involved with the DNA sample collection and storage process?
   Yes, I am working here for about four and half years and I am involved in the DNA sample collection process.

2. Please give me an idea about the whole process.
   **Collection:** there are two methods of collecting DNA samples:
   (i) One is from the crime scene and this is collected by the police (that is Investigation officers (IO)). We do not collect sample from the scene of crimes (SOC). Once police obtain samples from the SOC, then we asked the IO to fill up some forms and then we receive bodily substances or items collected by the IO, depending on the nature of the crime, for further analysis.

   (ii) Another way of sample collection is done inside the lab; in that case we collect bodily substances (like, blood, semen, saliva etc) directly from the body of the victims or suspects, in the presence of the police. We are only authorised to collect DNA samples from the bodies of victims or suspects inside the lab. We do not collect samples from the crime scene. DNA samples from the crime scene are only collected by the police.

   In this process normally we give a separate identification number or file number for every case. After opening a file for a particular case, the lab head assigned the case to one scientific officer and one lab technician. Then we extract DNA from either of these sources.

   **Analysis:** After DNA extraction, we go for DNA analysis depending on the nature of the case, for instance, if it is paternity testing, we do analysis for the identification of the paternity. Normally it takes about a month to get the result. Mainly it depends on our work load. However, if there is any urgency we try to finish the analysis as soon as possible. We use PCR technology for analysing the DNA. It involves different kits, such as, identity filer, y filer, X-plex, SGM plus etc. we try more than one method to draw an accurate conclusion, or if there is any confusion about a particular method.
Storage: after finishing the DNA profiling and delivering the results to the requested body (normally the police or the court) then we store those DNA samples in a cold place at 4 degree Celsius or frozen at -20 degree Celsius. We store it for 1-2 years. In case of DNA Profile, we retained them for unlimited period of time.

3. Do you have an approved policy governing the collection of DNA samples?
   No we do not have any policy but we have a working manual for guiding our sample collection, storage and analysis process.

4. Do you obtain informed consent before collecting DNA samples, If yes, what is the procedure (written or oral)? If no, why?
   Yes, in a written way. I am explaining you how it happened:
   Once a dispute arises or crime happens, victim or suspect is identified by the police at the first instance, and at that time the police prepared and signed an order form. Subsequently we receive that order form from the police along with that identified victim or suspect for obtaining their sample. While collecting the sample, we provide an identification form to the sample providers (whether the victim or suspect) and they sign it in front of the police. By signing that form, sample providers are actually giving their consent.

   In this process, we generally presume that the sample provider (victim or suspect) has given his or her consent freely. We also presume that victim or suspect has given enough information about the whole DNA sample collection process. So we do not explain the process of sample collection and its related matters. Sometime we ask their opinion about collection of their DNA, most of the time, victims or suspects are eager to get justice via this technology. Normally they do not bother giving their bodily substances or samples. Therefore, they even do not show any kind of reservation about its further use.

5. What information do you receive with a DNA sample (such as, name, address, age, gender, ethnicity of the accused and, purpose of the test, nature of crime etc)?
   Mainly we record information like, his or her name, parents name, address, age, gender, case number, purpose of the test, nature of the crime, source of the case (the court or the police) etc.
6. What kind of technology do you use in DNA profiling?
   We use PCR technology applying different methods or kits. Identity filer is the latest
   method we are currently using.

7. If new technology arrives, do you receive additional skill development training to be
   able to use such technologies?
   When new technology or methods arrive, there is an arrangement with an Indian lab for
   providing training — we hire a technician from that lab, he installs the technology and
   trains the lab scientific officers and lab technicians. He normally comes twice in a year.
   But he can come anytime, if we feel the necessity during the contract period. There is a
   lack of technician equal to his standard in Bangladesh.

8. Do you retain DNA sample, if yes, how long?
   Yes, our lab retains DNA samples for 1 year.

9. Do you retain DNA profiles, if yes how long?
   Yes, our lab retains DNA profiles for an indefinite period of time. DNA analysis results
   are retained both in the computer and paper based files.

10. What medium do you store DNA data in (paper/PC/microfilm)?
    We retain DNA data both in electronic and paper based files. There are personal
    computers (PC) for the lab head as well as for the scientific officers; we store all files in
    these computers. Paper based files are stored in the room of our lab head.

11. Who has access to those records?
    No other person can access DNA records kept in the lab. Only lab head and scientific
    officers can access this file. Scientific officers alone are able to access these data and files
    but only with permission from the laboratory head.

12. In order to encounter physical threats (fire, water, larceny etc), what measure/s are
    available?
    No back up facility yet. Since our lab is a new initiative in Bangladesh, still we are in
    process of organizing our lab. We do not have enough facilities and man powers.
Currently our back up facilities and other security measures are very poor. We are in a process of establishing a database, once it gets done, and then we will take proper step to encounter physical threats.

13. If you store data on the computer, do you have logical security measures (antivirus, firewall or others)?

Yes, I have Anti-virus for my computer. My PC is password protected as well.

14. Do you collect and store sample from Children or child offenders?

We collect and conduct DNA analysis from the juvenile offenders who are below 18 years old. They are sometime charged with rape or murder. We also collect sample from new-born in order to resolve paternity disputes. We get regular cases for child offenders (aged between 16-17 years old) similar to the adult offenders, though the number is very low compare to the adult’s DNA profiling. We do not have any separate mechanism or database to store or retain the child offenders or minor’s DNA data.

15. Who are allowed to access this lab?

No third parties are allowed. But in case of necessity or urgency, requested body (that is police in most cases) can visit the lab and can collect some information related to DNA analysis report with authorisation from court or concerned department.

16. How far law enforcing agencies are involved and exercise their power in the whole process?

Inside our lab there is no power of law enforcing agencies (police). Police exercise their power while collecting the bodily substances or items from the crime scene. And also while identifying the victim or suspects. While sending case and making the file they can exercise monopoly as well. As Law enforcing agencies involved in this process vitally, therefore we provide periodical training on regular basis. Moreover in order to enlighten the service providers and some consumers, in this field such as judges, lawyers, magistrate, forensic doctors we organise regular seminar, workshop and training program.
17. Other than court and crime investigation authorities, are there any other parties who are interested about DNA data (international body, election commission, hospitals or any other government departments)?

We get request from Immigration department for relationship establishment, also from some divisional hospitals (occasionally) to identify dead bodies. No private request is entertained in our lab. If we are allowed to entertain private cases it might corrupt the whole system and there will be no transparency as well as checks and balances.

18. What are the different cases/reasons you conduct DNA analysis for?

There are various areas; mainly we get cases to resolve paternity disputes, rape and murder cases, dead body and/or disaster victim identification, relationship establishment etc.

19. Do you feel the necessity of any legislation or policy framework for the management of this lab?

Yes, of course, the draft DNA legislation is under process of enactment.

20. Do you have Privacy Policy?

There is no strong privacy policy at this moment. But normally we have a practice or custom we do not share information with each other and also with outsiders.

21. How far are you hopeful about the future prospect of the lab?

I am satisfied and very happy with my lab. However there are some challenges or uncertainties, such as currently we are serving under a project. We do not have any clear and set organisational hierarchy. Moreover we have not got any promotion since our appointment. Some of us have already left this job and have joined another organisation. Therefore, once our job will come under government revenue budget as permanent positions, we will be more motivated and feel secure for providing better service.

I am hopeful that it will be expanded in future. The fruits of the DNA testing have been gradually appreciated by mass people. Generally people are happy with the positive outcomes of DNA testing. Now peoples even do not consider its high cost compare to revealing the truth and getting justice. After conducting DNA testing, most of the
families are happy. On the other hand, there are lots of cases who are dissatisfied about the test result as well.

22. Please tell me your idea about the cost-benefit of this lab in terms of the opportunities and challenges associated with the lab for the developing country like Bangladesh?

This is very costly technology for a country like Bangladesh. Cases come from poor victims mostly. For Bangladeshi poor people it is very high cost. There is a government fund for the poor victim. But compare to other countries, this is cheaper. Economic and technological shortcomings are the main challenges on the path to the future sustainability of the NFDPL. I believe this is one of the main gaps between developed and developing countries. If it can be removed, then the lab will function better.
1. **Are you involved with the DNA sample collection and storage process?**
   Yes, I am working here for more than two years. Normally my job is to supervise the whole collection process. Lab technicians also assist us in DNA sample collection and its related activities such as filling the forms etc. Lab technicians do their job under our supervision.

2. **Please give me an idea about the whole process.**
   When we receive a case with the court order, for example, paternity testing, Sub-inspector of Police or Investigating Officer (IO) brings the alleged father, mother and child in the lab. Then in the presence of that concerned IO, one scientific officer and one lab technician collect the sample from these three persons. There is an assigned day for every scientific officer to receive cases for that day. He or she will receive all cases for the whole day and he is the responsible person for that particular day. For instance, I am assigned for Tuesday and all cases are received under my supervision. There is an identification form inquiring lots of personal information from the victim or suspects (sample providers). Every detail is taken in that form. Before giving bodily substances or samples, sample provider fill that form and sign it. IO also signs it as witness. In this process, fingerprint of sample providers are also collected. We give a separate identification number, case number and file number for that case and so that we can identify the file easily.

   After sample collection, DNA is extracted from that sample. Then we analyse the extracted DNA with PCR technology. Finally we got the analysis result. This result is cross checked by doing the same test by another scientific officer among us. After cross checking this report is submitted to the lab head and once he approves it, then we make ready the final report and then lab head, assigned scientific officer signed it and a counter signed is taken from head of the forensic department. Finally we send the analysis result directly to the court. IO gets one copy if she or he wants it.
3. Do you have an approved policy governing the collection of DNA samples?
   No we do not have any policy but we have a working manual for guiding our sample collection, storage and analysis process.

4. Do you obtain informed consent before collecting DNA samples, If yes, what is the procedure (written or oral)? If no, why?
   When a suspect or victim arrives in the lab to have their DNA test conducted, we presume that they already know everything therefore, we do not inform them the whole DNA collection, storage, use and its related concerns and benefits. Generally sample providers come to provide their sample being directed by the court. That is why we presume that they already have sufficient information about the entire process.

5. What information do you receive with a DNA sample (such as, name, address, age, gender, ethnicity of the accused and, purpose of the test, nature of crime etc.)?
   Name, parents name, address, gender, age, case details including case number, if it is rape case how many people are involved, when the occurrence has happened, source of the case (from one stop crisis centre in the six divisional lab or police or the court) etc.

6. What kind of technology do you use in DNA profiling?
   We use PCR based DNA analysis - STR marker, there are different kits for analysing STR marker, like, identity filer (it is mostly used one), x plex, y filer. Depending on the nature of the case we also use other types of kit. When there is any confusion about the analysis result, then we apply one more kit in order to cross check that result.

7. If new technology arrives, do you receive additional skill development training to be able to use such technologies?
   In the beginning we got all foundation training. But once a new kit arrives, and then we use this kit reading the kit manual.

8. Do you retain DNA sample, if yes, how long?
Yes. We retain blood samples for 2 years and DNA samples extracted from other bodily substances or biological fluid are retained for 1 year. After completion of 2 years, we destroy those samples.

9. **Do you retain DNA profiles?**
   DNA profiles are retained indefinitely.

10. **What medium do you store DNA data in (paper/PC/microfilm)?**
    We store DNA data both in the electronic version as well as in the file. Paper files are stored inside the room of our lab head under his custody. Electronic reports are stored in the PC of our Lab head, as well as PCs of the scientific officers.

11. **Who has access to those records?**
    Only our Lab head can access them. But in his absence or with his permission scientific officers also are allowed or authorised to access stored data or files. No other third party can access these records.

12. **In order to encounter physical threats (fire, water, larceny etc), what measure/s are available?**
    We do not have adequate back up facility.

13. **If you store data on the computer, do you have logical security measures (antivirus, firewall or others)?**
    We have Anti-viral software and our all PCs are password protected. Those PCs are only handled by us.

14. **Do you collect and store sample from Children or child offenders?**
    Yes, even in case of new born DNA sample is collected and retained like the adult persons sample. We treat equally all samples both minor’s and adult person’s DNA samples. For instance, we receive almost fifty percent paternity testing cases. There is no accurate statistics, but there are several cases filed in the NFDPL regarding the child offender. 2-3 cases per day.
15. Who are allowed to access this lab and stored data?
    No third party is allowed, except authorization and in case of urgency.

16. How far law enforcing agencies are involved and exercise their power in the whole process?
    In every case IO at first, identifies the victim or suspects or accused, they also collect bodily substances from the crime scene. While collecting bodily substance from the body of victims or suspects in the lab, they become witness. There is an identification form and after signing the victim or suspects, police signed this form. During extraction and analysis process, there is no involvement of police, but after getting result, we send a copy of that result to the concerned IO.

17. Other than court and crime investigation authorities, is there any other parties who are interested about DNA data (international body, election commission, hospitals or any other Government departments)?
    Court, police and some embassies are mainly our consumers. Besides, some NGOs are interested about our service occasionally. There is no scope for private cases. All private cases need to come via court. Court and police are the only channels.

18. What are the different cases/reasons you conduct DNA analysis for?
    There are a number of cases, such as paternity testing, sibling testing, immigration dispute, disaster victim identification, rape and murder cases etc.

19. Do you feel the necessity of any legislation or policy framework for the management of this lab?
    Yes of course. We have proposed a DNA law The Draft law is under review by the government.

20. Do you have privacy policy?
    We do not have any privacy policy, but normally we do not share information with outsider. Only exception is IO and court.

21. How far are you hopeful about the future prospect of the lab?
We are very hopeful about the future sustainability of our lab. In order to detect criminal and innocent, this is a very important technology. However, there are some issues, if they can be resolved, then this lab will perform and sustain in a better way. This lab is now project based; we do not have any permanent organisational chart or organogram. Our salary and bonus are not regular. We have not got any promotion till our appointment. Some of us already left this job and have joined in another organisation. We do not get promotion though our appointment is almost like Government officers. We are appointed similar to the 11th grade under the National Pay Scale, 2005. Therefore this lab needs to come under revenue budget, and then all of us will get certainty about our job and salary. Skilled people and man power will be retained. Everyone will perform their duties efficiently and will contribute to this lab in more efficient way.

22. Please tell me your idea about the cost-benefit of this lab in terms of the opportunities and challenges associated with the lab for the developing country like Bangladesh?

In order to investigate a crime, there is no other better technology in Bangladesh than DNA profiling. The NFDPL is very important for the case investigation process and delivering justice. Now general people are getting justice. Therefore enforcement of justice is more important compare to the high cost of DNA testing. In terms of cost-benefit analysis, people consider that they are getting proper judgment. Sometime cost really does not matter to them. But for very poor victims, there are some funds from some human rights organisations. Therefore, this technology is very important even for a developing country like Bangladesh.
1. **Are you involved with the DNA sample collection and storage process?**
   
   Yes, I am working here since 2006. My main duty is DNA analysis, preparing analysis report and then submission; maintain all correspondence of this lab with outsiders. From the DNA sample collection, extraction, analysis up to the report submission is the common assigned duties for all scientific officers and lab technicians working in this lab.

2. **Please give me an idea about the whole process.**
   
   When the court gives an order requiring for DNA profiling for any particular case, the IO brings the alleged victim or suspect in the NFDPL. Then in the presence of that IO, one scientific officer and one lab technician collect DNA sample from that person. There is an assigned day for every scientific officer to receive all cases. There is an identification form with various information to fill in. As part of the collection process, we asked the alleged victim or suspect to fill the form and sign it. IO also signs the form as witness. Fingerprint of the sample providers are also taken. Subsequently we give separate identification number to that case or file.

   The next step is extraction of DNA sample and finally we analyse the DNA applying the PCR technology. If there is any confusion about a particular method used and also to draw an accurate conclusion, generally, we use more than one method. We also use another kit, depending on the type of case. That means when a DNA analysis result is completed by a scientific officer, then we cross check that result by doing similar test by another scientific officer. This cross checking is done confidentially under the guidance of the head of the laboratory. After cross checking we submit the final report to our lab head. Once he approves it, we send the final result directly to the court or to the IO (if he or she requests).

   The samples which are collected by the IO from the SOC, we follow the same analysis process. But for rape and murder cases we maintain separate forms to keep the record of this case.

3. **Do you have an approved policy governing the collection of DNA samples?**
No we do not have any policy but we have a working manual for guiding our sample collection, storage and analysis process.

4. **Do you obtain informed consent before collecting DNA samples, If yes, what is the procedure (written or oral)? If no, why?**
   Yes, in the written form. We obtain informed consent from sample providers by taking their signature in the identification form. We also inform that after the DNA sample collected and its analysis will be used in order to prove the allegation against him or her. A link will be established with the crime and it might prove him or her guilty or innocent.

5. **What information do you receive with a DNA sample (such as, name, address, age, gender, ethnicity of the accused and, purpose of the test, nature of crime etc.)?**
   Court order, identification form, name, parents name, age, gender, address, case number, whether he or she donated blood from his or her body within the last three months, if it is rape case how many people are involved, when the occurrence has happened, source of the case etc.

6. **What kind of technology do you use in DNA profiling?**
   We use PCR based DNA analysis that is- STR marker.

7. **If new technology arrives, do you receive additional skill development training to be able to use such technologies?**
   When I first join in this lab, I got some foundation training. But when new kits arrive then the practice is, we use kit reading manual. If any confusion arises, we consult it with our lab head. So we get training on our need basis.

8. **Do you retain DNA sample, if yes, how long?**
   Blood samples are retained for 1 year. DNA sample extracted from other bodily substances or biological fluid is retained for 2 years or more than that, it depends on the capacity of our lab. Once the capacity is full then we destroy DNA samples which are 2 years old.

9. **Do you retain DNA profiles?**
Yes, we retain DNA profiles for unlimited period of time for convicted offenders. But those who are acquitted we destroy their profiles. Our lab has a plan to create a DNA database to retain DNA profiles of convicted offenders.

10. What medium do you store DNA data in paper/PC/microfilm?
We stored DNA data two ways: one is electronic and other is paper based file. Files are mostly stored under the custody of our lab. There is no backup system for paper based files, but for electronic version, we kept them both in the PCs of all scientific officers, and in the PC of our lab head. Another copy of DNA profiling is stored in the analyser machine.

11. In order to encounter physical threats (fire, water, larceny etc), what measure/s are available?
No security measures are available so far.

12. If you store data on the computer, do you have logical security measures (antivirus, firewall or others)?
In order to encounter logical threat, we use antiviral software and our computers are password protected. Other than scientific officers, nobody is allowed to use these computers. But sometime we share our computer and data with each other (between and among scientific officers only) even though it is password protected.

13. Do you collect and store sample from Children or child offenders?
Yes, even in case of new born, we collect DNA sample and retain the collected like adult person's sample. In rape cases, there are some child offenders, age around 16-17 years old. We also collect samples from them and retain with other adults persons DNA data.

14. Who has access to those records?
Only our lab head has the access to those records, but in his absence or in case of urgent necessity of any case, with his permission scientific officers, can access those records. We are going to set up a new mechanism, under this new set up, during DNA analysis, all scientific officers and the lab head will have access to all data. But after the analysis is completed and the report submitted, only the lab head will have access to all data related to DNA profiling stored inside the lab.
15. Do you feel the necessity of any legislation or policy framework for the management of this lab?
Yes, of course. Draft DNA law is under review by the Ministry of Women and Children Affairs.

16. Do you have privacy policy?
No we do not have any privacy policy but in our laboratory system there is no scope for violation of privacy, as we do not share information with outsider (except the requesting body). If any case arrives related to family or friends, then somebody from that family or friend wants to know about DNA test results, because of proximity of relationship we normally inform them about the test result. Though we do not tell them who is handling the case in the laboratory.

17. How far law enforcing agencies are involved and exercise their power in the whole process?
From the crime scene to lab the whole situation is controlled by police. At first IO determines who is victim, suspect or accused and they also collect bodily substances from crime scene. In order to know the types of bodily sample, who are the victims and suspects, we have to depend on the police. Police also becomes witness while collecting DNA sample inside the lab.

18. Who are allowed to access this database?
No other third parties.

19. Other than court and crime investigation authorities, is there any other parties who are interested about DNA data (international body, election commission, hospitals or any other government departments)?
Other than court and police, some embassies and NGOs are interested about DNA testing. Any private request needs to come via court. Court and police is the only channel. For instance, once we got a request from Interpol (via Criminal Investigation Department of Bangladesh) to look for a match of a DNA Profile of an international criminal in our lab.

20. What are the different cases/reasons you conduct DNA analysis for?
Mainly we get request for DNA testing, for example, the paternity dispute, sibling testing, immigration cases, rape and murder cases, and other identity related cases.

20. Do you have any concern regarding the overall management of this lab

Yes, there are some issues, if they can be resolved then this lab will perform and sustain in a better way. We do not get promotion though our appointment is almost like government officers. We are appointed similar to the 11th grade under the national pay scale, 2005.

21. How far are you hopeful about the future prospect of the lab?

I am very hopeful. But as a new set up currently there are some challenges, for example, there is no clear organogram for our positions. General public do not know about our lab there is a lack of information, such as, how to do DNA test and to whom need to approach, who is controlling the lab etc. Besides, there is a lack of awareness. Some people hide it for their societal reputation; they do not want to share it publicly. Overall it is well accepted technology from societal point of view. If the controlling authority is positive about its future, then the lab has good prospects. In order to aware general people and institutions related to this service (eg judges, Magistrates, police, lawyers, forensic departments), we provide regular training to the law enforcing agencies. We also organise regular seminars, workshop both at the urban and rural areas.

22. Please tell me your idea about the cost-benefit of this lab in terms of the opportunities and challenges associated with the lab for the developing country like Bangladesh?

In order to investigate a case as well as to prevent crime, there is no other potential technology in Bangladesh than the DNA profiling. General people are getting justice. While cost benefit analysing, people consider that they getting justice smoothly and fairly. This is very important even a developing country like Bangladesh. There are some arrangements of government funds for poor victims, as well as some NGOs or human rights organisations provide their assistance to the poor victims (specially for the victimised women).
1. **Are you involved with the DNA sample collection and storage process?**
   Yes, I am involved in the DNA sample collection and storage process. My main job responsibilities include sample collection, analysis, preparing the file once a case is sent to this lab, preparing the DNA analysis results and submitting to the lab head etc.

2. **Please give me an idea about the whole process.**
   We have an assigned day for each one of us (every scientific officer) to receive cases for that day. When a case (for instance, paternity testing) comes with court order, investigating officer brings the alleged father, mother and child. Then in the presence of the IO, one scientific officer (like me) along with one lab technician, collect blood sample or any other sample from these three persons. There is an identification form, before collecting samples, we ask the victims or suspects to fill the form and sign it. IO also signs the form as witness. There is a separate identification number, case number and file number, every details are taken in that form so that we can identify the file separately. In case of SOC samples, there are two other types of forms.

   After collecting sample, we extract and analyse the DNA and finally the analysis result determine who the father for this child is. In order to analyse the extracted DNA data, we do the PCR method. Most of the times we cross check the result by doing the same test by another scientific officer. After cross checking, this report is submitted to the lab head and once he approves the result, the final report is signed by me (as scientific officer), the lab head and a counter signature is taken from the head of the forensic department. Then we send the final result directly to the court. We also give one copy to the IO, if he or she wants it for the necessity of the case.

3. **Do you have an approved policy governing the collection of DNA samples?**
   No we do not have any policy but we have a working manual for guiding our sample collection, storage and analysis process.
4. **Do you obtain informed consent before collecting DNA samples, If yes, what is the procedure (written or oral)? If no, why?**

Yes, we obtain consent by taking signature of the sample providers (that is victims or suspects) in the identification form. According to general practice of this lab, when a matter is referred to us with the Court order authorising sample collection from the parties to the case, then these parties (whether suspect or victim) arrives at the laboratory for giving their samples. We presume that the victim or suspect has given his or her consent freely to the police or their lawyer before arriving to the lab. Therefore we do not further explain about the reason and process of sample collection rather we only ask them to sign the identification form.

5. **What information do you receive with a DNA sample (such as, name, address, age, gender, ethnicity of the accused and, purpose of the test, nature of crime etc.)?**

Name, parents name, address, case number, whether he or she donated blood in his or her body within last three months, if it is rape case how many people are involved, when the occurrence has happened, source of the case (either OCC in the six divisional lab/police /court).

6. **What kind of technology do you use in DNA profiling?**

We use PCR technology using different kits for analysing STR marker. We mostly use identity filer, and sometime we also X plex, y filer.

7. **If new technology arrives, do you receive additional skill development training to be able to use such technologies?**

When we join this service, we got foundation trainings. But once a new kit arrives, and then we use this kit reading its manual. When we face difficulty then we consult with lab head. Actually we got training on our need basis.

8. **Do you retain ‘DNA sample’, if yes, how long?**

Yes. We retain DNA samples for 2 years.

9. **Do you retain ‘DNA profiles’?**
Yes. We retain DNA profile for unlimited period of time.

10. **What medium do you store DNA data in (paper/PC/microfilm)?**
We store DNA data both in the electronic and paper based versions. Files are kept in the room of the lab head under his custody. We kept electronic versions both in the pc of our lab head as well as in our computers (Scientific officers).

11. **Who has access to those records?**
Only lab head has access to those stored records, but in his absence or with his permission, the scientific office can also access these records or files.

12. **Do you have an approved policy governing the collection of DNA samples?**
We do not have any policy. But we have a working manual. By working with each other we learn about the whole process maintained in this lab.

13. **Do you collect and store sample from Children or child offenders?**
Yes, we collect sample from children, even in case of new born, mainly for paternity testing. We store DNA samples and profiles of child offenders along with adult’s samples. Even in case of new born the sample is collected and retained like the adult persons sample. We have no facility to provide different treatment for child offenders.

14. **Do you have privacy policy?**
No we do not have any privacy policy. But normally we do not share information with outsiders.

15. **How far law enforcing agencies are involved and exercise their power in the whole process?**
Police identifies victims or suspects and they also collect bodily substances from the crime scene. In that case we have nothing to do. We always have to rely on the police to know about the sample type and also to identify the victim or suspect. Police also become witness while we collect DNA sample inside the lab.
16. In order to encounter physical threats (fire, water, larceny etc), what measure/s are available?
   We do not have adequate back up facility and protective measures. But we are in a stage of building infrastructure for our lab.

17. If you store data on the computer, do you have logical security measures (antivirus, firewall or others)?
   We have anti-virus and our computers are password protected.

18. Who are allowed to access this database?
   No third parties are allowed to access reports of this lab. But they can visit the lab sometime with authorisation.

19. Other than court and crime investigation authorities, are there any other parties who are interested about DNA data (international body, election commission, hospitals or any other government departments)?
   Judge and police are main consumers of the lab service. Some embassies and NGOs are also interested. But no private request is allowed. Any kind of request must come via Court and or police. If we allow private request, then there is undue number of cases, and it will be difficult for us to handle and provide an accurate DNA results.

20. What are the different cases/reasons you conduct DNA analysis for?
   Paternity dispute, sibling testing, immigration cases, rape, murder cases etc.

21. Do you feel the necessity of any legislation or policy framework for the management of this lab?
   Yes. Legislation is very important. Therefore we have prepared a Draft DNA Act. The Draft DNA law is under review by the government.

22. Do you have any concern regarding the overall management of this lab
   Yes, there are some issues, if they can be resolved, then this lab will perform in a more efficient way. We do not get promotion though our appointment is almost like government officers. We are appointed similar to the 11th grade under the national pay scale, 2005.
23. How far are you hopeful about the future prospect of the lab?

I am very hopeful about its future prospect. In order to detect criminal and exonerate innocent, this is very important technology for the justice delivery system of Bangladesh. Gradually we are getting positive responses both from general people as well as from the service providers (eg judges, lawyers, and police).

24. Please tell me your idea about the cost-benefit of this lab in terms of the opportunities and challenges associated with the lab for the developing country like Bangladesh?

In terms of cost-benefit analysis, I would say, general people are getting justice without any harassment. This is very important compare to other challenges (such as the cost of DNA testing). People mainly consider that they getting accurate judgment smoothly and fairly. Cost is of course matter for poor victims. Therefore those who are poor, there is some government as well NGO funds for them.
R7, Lab Technician, NFDPL, Interview Date 28/09/2010, 11:30 am

1. Are you involved with the DNA sample collection and storage process?
Yes, I joined in this lab in 2006. Since then I am involved in DNA sample collection process.

2. Please give me an idea about the whole process.
When we receive a case, we collect sample from the respective victim or suspect. After collecting sample, at first, we conduct the screening, then we extract DNA from that collected samples and finally we analyse the extracted DNA to get the DNA analysis results or profiles.

In the collection process we maintain separate forms depending on the nature of the case. The sources various samples are also different, for instance some samples are collected from the SOC by the IO. We collect some other samples directly from the body of the suspects or victims. In both types of collection we need a court order or permission from the court for DNA collection and analysis.

3. Do you have an approved policy governing the collection of DNA samples?
No we do not have any policy but we have a working manual for guiding our sample collection, storage and analysis process.

4. Do you obtain informed consent before collecting DNA samples, If yes, what is the procedure (written or oral)? If no, why?
Yes, we provided the identification form. Sample providers (victim or suspects) filled and signed that form in front of the police. By filling and signing the form they provide their consent. We do not ask for their consent, or normally we do not explain the whole process of sample collection to them.

5. What information do you receive with a DNA sample (such as, name, address, age, gender, ethnicity of the accused and, purpose of the test, nature of crime etc.)?
Name, parents name, age, gender, address, case number, if it is rape case how many people are involved, when the occurrence has happened, source of the case etc.
6. **What kind of technology do you use in DNA profiling?**
   
   PCR technology which is based on the STR marker and our mostly common used kit is Identity Filer. We also use other kits such as, X-Plex, Y-Filer etc. depending on the type of the case and also if there is any confusion about any test results.

7. **If new technology arrives, do you receive additional skill development training to be able to use such technologies?**
   
   After joining this lab, I once got some training. I have not got any further training.

8. **Do you retain ‘DNA sample’, if yes, how long?**
   
   We retain DNA sample for 1 year.

9. **Do you retain ‘DNA profiles’?**
   
   We retain DNA profiles for unlimited time.

10. **What medium do you store DNA data in (paper/PC/microfilm)?**
    
    We store DNA data both in electronic and paper based files. Paper files are mostly kept under the custody of the lab head under his control and no other copies or back up for paper based files are kept. But for electronic versions, we retain DNA data both in the computer of our lab head as well as the computers of all scientific officers.

11. **Who has access to those records?**
    
    Only Lab head has access to all stored records, but in his absence or in case or urgency, with his permission scientific officer can access these files or records.

12. **In order to encounter physical threats (fire, water, larceny etc), what measure/s are available?**
    
    We do not have adequate facilities to encounter physical threats. We also do not have back up facilities. Especially for paper based files.

13. **If you store data on the computer, do you have logical security measures (antivirus, firewall or others)?**
    
    We have password protected computer and antivirus software. And those computers are only used by the scientific officers. For electronic records, we kept a copy in the CDs.

14. **Who are allowed to access this database?**
No outsiders are allowed to access our DNA analysis records or results. They can only visit the lab.

15. Other than court and crime investigation authorities, is there any other parties who are interested about DNA data (international body, election commission, hospitals or any other government departments)?
Judge and police are the main users of our service. Apart from that, occasionally, some embassies and NGOs are also interested about our service. But who ever might be the requesting body, any request for DNA testing must come via court order. We do not allow private requests.

16. What are the different cases/reasons you conduct DNA analysis for?
Paternity dispute, sibling testing, immigration, rape case, murder case, disaster victim identifications etc.

17. Do you have an approved policy governing the collection of DNA samples?
We do not have any written policy. But we have developed an in-house practice from our colleagues doing work with each other.

18. Do you collect and store sample from juvenile or child offenders?
Yes, even in case of new born DNA sample is collected and retained like the adult persons sample. We treat all DNA samples both from minor and adult person equally.

19. Do you have privacy policy?
We do not have any privacy policy, but normally we do not share information with outsider. Only exception is IO and court.

20. How far law enforcing agencies are involved and exercise their power in the whole process?
In every case investigating officer at first, identifies the victim or suspect or accused, they also collect bodily substances from the crime scene. While collecting bodily substance from the body of victim or suspect in the lab, they become witness. There is an identification form and after signing by victim or suspect, police signed this form. During
extraction and analysis process, there is no involvement of police, but after getting result, we send a copy of that result to the concerned IO.

21. Do you feel the necessity of any legislation or policy framework for the management of this lab?
Yes, we do. We have proposed a draft DNA law and this draft law is under review by the government.

22. How far are you hopeful about the future prospect of the lab?
There are lots of problems with the management of this lab. We have salary and job discrimination. Initially we were appointed under MSP-VAW project but now our status has been changed. At present we are appointed by a third party vendor company. Under the current recruitment practices, we do not have any pay scale, no regular salary and bonus. We are dissatisfied with that.

Besides, there is no adverse opinion in the mind of general people. Rather when a result is published and parties get justice then their reliability on the justice delivery system, particularly on the DNA lab, increase more than ever before. Some people are suspicious about the lab and technology. Awareness building is important, especially for judges and lawyers, because lots of judges do not understand the technology and they do not feel interest about this technology.

23. Please tell me your idea about the cost-benefit of this lab in terms of the opportunities and challenges associated with the lab for the developing country like Bangladesh?
In order to identify a criminal, at present, DNA profiling is the potential mechanism for Bangladeshi judicial system. The NFDPL is very important platform for all. In terms of opportunities and challenges, maintaining this lab is of course a big challenge for a country like Bangladesh. Nevertheless enforcement of justice for all is more important than any other things.
R8, Lab Technician, NFDPL, Interview Date 29/09/2010, 12:15 pm

1. Are you involved with the DNA sample collection and storage process?
   Yes, I am working here for almost one and half year and I assist scientific officers in the DNA sample collection and storage process.

2. Please give me an idea about the whole process.
   When the court sent a case with an order form, then we assist scientific officers in collecting DNA sample from the victims or suspects or their child (if the case is related to paternity testing). What would be the type of sample providers it always depends on the type of the case. Police brings the victim or suspect in the lab and they present there as witness while collecting DNA samples. After collecting samples, at first, we conduct screening, then we extract DNA from that sample and finally we analyse the extracted DNA for getting desired result. SOC is another source of samples and such samples are collected by the police.

3. Do you have an approved policy governing the collection of DNA samples?
   No we do not have any policy but we have a working manual for guiding our sample collection, storage and analysis process.

4. Do you obtain informed consent before collecting DNA samples, If yes, what is the procedure (written or oral)? If no, why?
   When suspects or victims arrive in the lab to conduct their DNA test, we ask the victim or suspect if they have any objection regarding this sample collection procedure and its purpose of collection. By filling the identification form and signing it they provide their consent on the collection process. We feel there is no necessity of giving any further explanation. We believe this is not our job to explain everything to the sample providers. We provide identification form and we believe it is self-explanatory. So we presume that they are already informed.

5. What information do you receive with a DNA sample (such as, name, address, age, gender, ethnicity of the accused and, purpose of the test, nature of crime etc.)?
Victim’s or suspects name, parent’s name, age, gender, address, case number, purpose of the test, case type, if it is rape case how many people are involved, when occurrence has happened, source of the case etc.

6. **What kind of technology do you use in DNA profiling?**
   We used PCR technology which is based on the STR marker and our mostly common used kit is Identity Filer. I believe Identity filer is one of the most reliable one. We also use other kits such as, X-Plex, Y-Filer etc. depending on the type of the case and also if there is any confusion about any test results.

7. **If new technology arrives, do you receive additional skill development training to be able to use such technologies?**
   After joining this service, we have got training one time. We the lab technicians do not have got any further training. But when new technology arrives we tried to learn it using kit manual and also we seek advice from our lab head.

8. **Do you retain DNA sample, if yes, how long?**
   Yes, we retain DNA samples for one year.

9. **Do you retain DNA profiles?**
   Yes, we retain DNA profiles for unlimited period of time.

10. **What medium do you store DNA data in (paper/PC/microfilm)?**
    We keep record of the DNA analysis result both in the paper based files and in the computers. All paper files are kept in the personal custody of the lab head. For electronic copies DNA analysis results are stored in the computers of the lab head and the scientific officers.

11. **Who has access to those records?**
    No unauthorised person can access DNA data stored in the NFDPL, only lab head and scientific officers can access them. But in case of scientific officers, they can do so, only with the authorisation or permission from our head.
12. In order to encounter physical threats (fire, water, larceny etc), what measure/s are available?
   I do not have any clear idea.

13. If you store data on the computer, do you have logical security measures (antivirus, firewall or others)?
   I do not have any clear idea.

14. Who are allowed to access this database?
   Normally outsiders or third parties are not allowed to visit this lab, if there is any genuine cause and urgency, only in that case police can visit this lab and collect information related to the DNA analysis.

15. Other than court and crime investigation authorities, is there any other parties who are interested about DNA data (international body, election commission, hospitals or any other Government departments)?
   Other than court and police, some embassies and NGOs are interested about our service and they would like determine some cases via DNA test. All kinds of request must come through court’s approval. Nobody directly can request us to conduct a DNA analysis.

16. What are the different cases/reasons you conduct DNA analysis for?
   Paternity testing, rape case, immigration disputes, identification related cases, inheritance disputes, murder cases and so on.

17. Do you collect and store sample from Children or child offenders?
   Yes, even in case of new born we collect and retain DNA sample like the adult person’s sample. We treat all samples equally. There is no accurate data on the number of cases related to juvenile offenders but, on an average about 25–30% of the cases sent to our lab for DNA profiling are of the juvenile offenders.

18. Do you have privacy policy?
   We do not have any privacy policy, but normally we do not share information with outsiders. Only exception is IO and court.
19. **How far law enforcing agencies are involved and exercise their power in the whole process?**

In every case at first, IO identifies the victim or suspect or accused, they also collect bodily substances from the crime scene. There is an identification form and after signing that form by victim or suspect, police also signed this form as witness. During extraction and analysis process, there is no involvement of police, but after getting result, we send a copy of that test result to the concerned IO. There is no influence of police inside our lab.

20. **Do you feel the necessity of any legislation or policy framework for the management of this lab?**

Yes, we feel necessity of a law and So far I know one draft law is under process of enactment.

21. **How far are you hopeful about the future prospect of the lab?**

The lab has a big future prospect for the country like Bangladesh. However, there are some challenges such as; there is job discrimination among us. That means initially, we were appointed under the MSP-VAW project but now our status has been changed. At present, we are appointed under a different company. Under the current recruitment rule, we do not have any pay scale, nor is our salary regularly paid or bonuses allocated.

If our salary and job discrimination issues get resolved, then I am hopeful about future prospect of this lab.

22. **Please tell me your idea about the cost-benefit of this lab in terms of the opportunities and challenges associated with the lab for the developing country like Bangladesh?**

The cost of DNA testing is higher for poor victims. If the cost of DNA testing could lower than the existing one, then it would be beneficial for the general people.
R9, Lab Technician, NFDPL, Interview Date 30/09/2010, 10:30 am

1. Are you involved with the DNA sample collection and storage process?
   Yes, I have been working here for more than two years, and I am involved in the DNA sample collection and storage process.

2. Please give me an idea about the whole process.
   After receiving a case from the court, at first we obtain samples from the body of the suspects or victims (as the case may be). We do not collect samples from the SOC. This collection is conducted by the police. After obtaining the samples, we go for screening of that sample. After completion of screening process, we extract DNA from that sample and finally we conduct analysis for getting a result. In the whole process there are separate forms and nature of the form depends on the nature of the case. Some of these forms need to be signed by the sample providers, while others are signed by the IO.

3. Do you have an approved policy governing the collection of DNA samples?
   No we do not have any policy but we have a working manual for guiding our sample collection, storage and analysis process.

4. Do you obtain informed consent before collecting DNA samples, If yes, what is the procedure (written or oral)? If no, why?
   Yes, we obtain consent from the sample providers in a written way that means we obtain their signature in an identification form. Before starting the sample collection, filling that form and then obtaining signature from the sample providers is the general practice of our lab. Therefore, by filling and signing that form sample providers give their consent.

5. What information do you receive with a DNA sample (such as, name, address, age, gender, ethnicity of the accused and, purpose of the test, nature of crime etc.)?
   Name, parents name, age, gender, address, case number, if it is rape case how many people are involved, when the occurrence has happened, source of the case (either from one stop crisis centers in the six divisional labs or police etc.)

6. What kind of technology do you use in DNA profiling?
We use PCR technology which is based on the STR marker. We mostly use the identity filer. We also use other type of kits, but it depends on the nature of the case.

7. If new technology arrives, do you receive additional skill development training to be able to use such technologies?
   Once new method arrives then our lab head gives a briefing to the scientific officers and train them how to use this kit or method. Then scientific officers convey their briefings to us.

8. Do you retain DNA sample, if yes, how long?
   Yes. We retain other type of samples for 1 year, blood samples for 2 years.

9. Do you retain DNA profiles?
   Yes. We retain DNA profiles for unlimited period of time.

10. What medium do you store DNA data in (paper/PC/microfilm)?
    We store DNA data both in paper based files as well as in the electronic versions. Paper files are kept in the custody of the lab head. Electronic copies are kept in the computers of our lab head as well as the computers of the scientific officers.

11. Who has access to those records?
    Mainly our Lab head has access all kinds of stored or recorded DNA data. But in his absence, scientific officer can access these data only with his permission. No other person can access them.

12. In order to encounter physical threats (fire, water, larceny etc), what measure/s are available?
    In order to encounter physical threats, normally back up facilities are required to be strong. Since our lab is a new one, our back facilities are not adequate enough. But we will develop it soon.

13. If you store data on the computer, do you have logical security measures (antivirus, firewall or others)?
We have Antivirus software in our lab computers and these computers are password protected. These computers are only handled by the scientific officers.

14. Do you collect and store sample from children or child offenders?
We collect and store DNA samples from children in the same way as adults. Even in case of new born the sample is collected and retained like the adult person’s sample. We do not have any separate storage facility for retaining the DNA data obtained from the child or child offenders.

15. Who are allowed to access this database?
Nobody can access the records of DNA data, other than emergency and authorisation.

16. How far law enforcing agencies are involved and exercise their power in the whole process?
Police identifies victim or suspect and they also collect DNA evidences from crime scene. There is an identification form and after filling and obtaining signature by victim or suspect, police signed that form as witness. From identifying parties of the case to collecting evidence from the crime scene, the whole scenario is controlled by police. In that case we have nothing to do. But once we received the sample, police have no influence or control on our work.

17. Other than court and crime investigation authorities, is there any other parties who are interested about DNA data (international body, election commission, hospitals or any other government departments)?
Other than court and police some embassies are interested about DNA testing. All private cases need to come via court. Court and police is the only channel.

18. What are the different cases/reasons you conduct DNA analysis for?
Paternity dispute, sibling determination, immigration disputes, rape cases, murder cases, disaster victim identification etc.
19. Do you feel the necessity of any legislation or policy framework for the management of this lab?
Yes, a DNA Act is very important. A Draft DNA law is jointly proposed by our lab as well as the MSP-VAW project office and that draft law is in the process of enactment.

20. Do you have privacy policy?
Our lab does not have any privacy policy, but we do not share information with outsiders.

21. How far are you hopeful about the future prospect of the lab?
I am very hopeful about its future prospect. In order to detect criminal and innocent, this is very important technology. During the first phase of MSP-VAW project, we got appointment under government. But from the second phase of this project, our job status has been changed. Now our recruitment is outsourced, and our salary, bonus is processed by a human resource company or a third party Vendor Company. Therefore, I feel we do not have any job security. If our lab comes under Bangladesh government’s revenue budget, then we will get certainty about our job, promotion and salary. It will actually motivate us to perform our duties in a better way and will ensure lab sustainability.

22. Please tell me your idea about the cost-benefit of this lab in terms of the opportunities and challenges associated with the lab for the developing country like Bangladesh?
The use of DNA evidence for detecting actual offenders has revolutionised the whole legal system of Bangladesh. Before people was harassed in terms of money, and time. Now with the use of DNA evidence people are getting justice fairly within a reasonable time span, and of course this has reduced the case related costs in many respects both for the government as well as for the parties to the case. For example, it reduced the costs related to investigation, trial, appeal and review.
Free nodes and tree nodes addressed and represented two main research questions:

(i) Human rights and privacy issues
(ii) Gap between UK and Bangladesh DNA service system in the justice delivery system

<table>
<thead>
<tr>
<th>Tree nodes</th>
<th>Sub-Tree nodes</th>
<th>Further sub-tree nodes</th>
<th>Free Nodes</th>
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<tbody>
<tr>
<td>Human Rights and Privacy Issues</td>
<td>1. Lack of Trust and Awareness among Public</td>
<td>i. Lack Awareness</td>
<td>Same as further Sub-tree nodes</td>
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<td></td>
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<td>ii. Lack of Trust</td>
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<td>2. Collection and Retention of DNA sample and profile</td>
<td>i. DNA sample and personal information collection</td>
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<td></td>
<td></td>
<td>(a) collection of personal information;</td>
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<td>(b) no written policy governing sample collection;</td>
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<td>(c) sample collection by lab staff;</td>
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<td>(d) sample collection from crime scene;</td>
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<td>ii. Retention of DNA sample</td>
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<td>(a) DNA sample retention for 1 year;</td>
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<td>(b) DNA samples are retained for 6 months;</td>
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<td>(c) retention of blood sample for 2 years and then destruction;</td>
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<td>iii. Retention of DNA Profile</td>
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<td>(a) retention of DNA profile indefinitely;</td>
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<td>iv. Storage of DNA data both in the PC and Paper files;</td>
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<td>3. Lab Access</td>
<td>i. No Lab access to outsiders;</td>
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<td>ii. no policy for right to access;</td>
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<td>iii. only lab head and scientific officers can access DNA data;</td>
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<td>iv. police can access lab in case of urgency;</td>
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<td>4. Informed</td>
<td>i. consent collection, but not always informed;</td>
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</table>
| Consent Issues | ii. Lab Staff presume that consent has been given;  
   | iii. no additional explanation and information by lab staff while consent collection;  
   | iv. sample provider informed a little bit about use of their DNA;  
   | v. sample providers are more keen to get justice than considering the importance of free consent;  
   | vi. Sample providers are not aware about right to informed consent;  
   | vii. Consent giving by signing identification form;  
   |
| 5. Involvement, Skill and Power of Police | i. Involvement of Police  
   |   (a) Collection of sample from crime scene;  
   |   (b) IO brings the victim or suspect;  
   |   (c) IO identifies victims or suspects;  
   |   (d) role of IO as witness;  
   | ii. power of police  
   |   (a) no power inside the lab, but can exercise monopoly while dealing a case;  
   | iii. Skill of law enforcing agencies  
   |   (a) lack of knowledge about DNA evidence collection;  
   |
| 6. Societal concerns: Reputation or Stigma | i. No private cases are entertained.  
   |
| 7. Equal Treatment Both Child and adults DNA samples | i. No Special Treatment for Child's DNA data  
   |
| 8. Lack of Legislation and Policies | i. Current legislation set up hap hazardous;  
   |   (a) legislation under process;  
   |   (b) no comprehensive law;  
   |   (c) No Policy Governing DNA Collection  
   | ii. No Privacy Policy  
   |
(a) Case information sharing with family;
(b) practice not sharing information with outsiders;

| Gap Between Developed-Developing Countries | 1. Development Cooperation | i. Economic-technological gaps;
| | | ii. lack of development cooperation;
| | | 2. Future of NFDPL | i. A reliable and good investigative tool
| | | (a) effective role of judges is important;
| | | (b) fund for poor victims;
| | | (c) Justice is important high cost;
| | | (d) Lab needs to come under revenue budget;
| | | (e) Public Reliance is increasing;
| | | (f) Reduction of DNA test cost is important;
| | | (g) set up new mechanism-back up facility;
| | | ii. Sustainability of Lab
| | | (a) lab is potential and scope for future sustainability.
| | | 3. Job Discrimination and Uncertainty | i. Job Discrimination;
| | | ii. Job Issues;
| | | iii. Low Payment and Irregular Benefits;
| | | iv. No clear Hierarchy;
| | | v. No Regular Promotion;
| | | vi. Recruitment by third party vendor company;
| | | 4. Lack of Knowledge of Judges and Lawyers | i. Non-cooperation and co-ordination among service providers; |
| 5. Shortage of Technical Hands | i. appointing technicians from other countries;  
|                               | ii. lab technicians are not skilled enough |
| 6. Other Challenges           | i. Lack of Information;  
|                               | ii. logical securities are poor;  
|                               | iii. No adequate back up facilities;  
|                               | iv. physical security measures are not adequate;  
|                               | v. no scope for systematic and well defined training;  
|                               |   (a) No Scope for Regular Training;  
|                               | vi. Monitoring and Oversight Power is very poor  
|                               |   (a) Lack of Check and Balance;  
|                               |   (b) No Regular Meeting. |
INITIAL APPLICATION APPROVAL
In reply please quote: HE10/114
Further Enquiries Phone: 4221 4457

22 June 2010

Ms Khaleda Parven
Faculty of Law
University of Wollongong
NSW 2522

Dear Ms Parven,

Thank you for your response to the HREC review of the application detailed below. I am pleased to advise that the application has been approved.

Ethics Number: HE10/114
Project Title: The forensic use of DNA information: Genetic privacy and other challenges.
Researchers: Ms Khaleda Parven, Dr Jakkrit Kuanpocht
Approval Date: 17 June 2010
Expiry Date: 16 June 2011

The University of Wollongong/SESIAHS Humanities, Social Science and Behavioural HREC is constituted and functions in accordance with the NHMRC National Statement on Ethical Conduct in Human Research. The HREC has reviewed the research proposal for compliance with the National Statement and approval of this project is conditional upon your continuing compliance with this document. As evidence of continuing compliance, the Human Research Ethics Committee requires that researchers immediately report:

- proposed changes to the protocol including changes to investigators involved
- serious or unexpected adverse effects on participants
- unforeseen events that might affect continued ethical acceptability of the project.

You are also required to complete monitoring reports annually and at the end of your project. These reports are sent out approximately 6 weeks prior to the date your ethics approval expires. The reports must be completed, signed by the appropriate Head of School, and returned to the Research Services Office prior to the expiry date.

Yours sincerely

A/Professor Steven Roodenrys
Chair, Human Research Ethics Committee

Cc: Dr Jakkrit Kuanpocht, Faculty of Law
AMENDMENT APPROVAL
In reply please quote: HE10/114
Further Enquiries Phone: 4221 4457
GH:CJ

25 May 2011

Ms Khaleda Parven
Faculty of Law
University of Wollongong

Dear Ms Parven,

I am pleased to advise that the amendment request dated 17 May 2011 to the following Human Research Ethics application has been approved. The University of Wollongong/ISLHN Social Science HREC is constituted and functions in accordance with the NHMRC National Statement on Ethical Conduct in Human Research.

Ethics Number: HE10/114
Project Title: The forensic use of DNA information: Genetic privacy and other challenges.
Name of Researchers: Ms Khaleda Parven, Dr Jakkrit Kuanpoth
Amendment/s:
- Change to protocol: Collection of data through survey questionnaire
- Revised Participant Information Sheet and Consent Form

Amendment Approval Date: 19 May 2011
Expiry Date: 16 June 2011

Please remember that in addition to reporting proposed changes to your research protocol the HREC requires that researchers immediately report:
- serious or unexpected adverse effects on participants
- unforeseen events that might affect continued ethical acceptability of the project.

You are also required to complete monitoring reports annually and at the end of your project. These reports are sent out approximately 6 weeks prior to the date your ethics approval expires. The reports must be completed, signed by the appropriate Head of School, and returned to the Research Services Office prior to the expiry date.

Yours sincerely

A/Professor Garry Hoban
Chair, Social Sciences
Human Research Ethics Committee

Cc: Dr Jakkrit Kuanpoth, Faculty of Law, Bldg 67
RENEWAL APPROVED  
In reply please quote: HE10/114  
Further Enquiries Phone: 4221 4437  
KC:CJ

7 July 2011

Ms Khaleda Parven  
Faculty of Law  
University of Wollongong

Dear Ms Parven

Thank you for submitting the progress report. I am pleased to advise that renewal of the following Human Research Ethics application has been approved.

Ethics Number: HE10/114  
Project Title: The forensic use of DNA information: Genetic privacy and other challenges.  
Researchers: Ms Khaleda Parven, Dr Jakkrit Kuanpoch  
Date Approved: 7 July 2011  
Renewed From: 17 June 2011  
New Expiry Date: 31 August 2011

Please note that approvals are granted for a twelve month period. Further extension will be considered on receipt of a progress report prior to expiry date.

This certificate relates to the research protocol submitted in your original application and all approved amendments to date. Please remember that in addition to completing an annual report the Human Research Ethics Committee also requires that researchers immediately report:

- proposed changes to the protocol including changes to investigators involved
- serious or unexpected adverse effects on participants
- unforeseen events that might affect continued ethical acceptability of the project.

Yours sincerely

A Professor Garry Hoban  
Chair, Social Sciences  
Human Research Ethics Committee

cc: Dr Jakkrit Kuanpoch, Faculty of Law, Bldg 67
APPENDIX D

University of Wollongong

(Note for Ethics Committee: This is an English translation for the Survey Questionnaire, it be will in Bengali, where the participant does not understand English)

Survey Questionnaire

Name:  
Gender: ☐ Male ☐ Female

Profession:

Age group:
☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ 41-45 ☐ 46-50 ☐ 51-55 ☐ 56-60  ☐ 60+

1. What are the hierarchies of this laboratory?
   a) -----------  ------
   b) -----------  ------
   c) -----------  ------
   d) -----------  ------

2. Please mention the type of employment status?
   ☐ Permanent ☐ Contractual ☐ Casual ☐ Project Life time

3. In which year the project was established?
   ☐ 0-1 Year ☐ 1-2 years ☐ 2-3 years ☐ 4-5 years

5. What types of support the lab is providing? (Please rank like 1,2,3….. according to priority)
Legal support for women-------- Various civil and criminal cases------
Serve the judiciary------ Research only--------
Others (if any)--------

6. So far what kind of services provided from the lab?
   □ Paternity proof
   □ Relationship Proof
   □ Identity related problems
   □ Dead body identification
   □ Immigration
   □ Rape and/or Murder cases
   □ All services mentioned above
   □ Others if any

7. Which levels of employees are responsible for sample collection?
   □ Lab Head       □ Scientific office       □ Lab technician
   □ More than one person is responsible (like…………………………………………

8. How do you retain the DNA Profiles?
   □ Paper based file
   □ Electronic database
   □ Both

9. How long do you retain DNA profiles?
   □ 0 -1Year       □ 1-2 year       □ 2-3 year       □ Unlimited

10. Do you retain DNA Samples?
    □ Yes (if yes, go to question no 11)       □ No (if No, go to question No 12)

11. What is the maximum period for the retention of DNA samples?
12. How often do you destroy the DNA samples?
- ☐ 0 -1 Year
- ☐ 1-2 Year
- ☐ 2-3 Year
- ☐ Unlimited
- ☐ do not destroy (if not, please note the reason)

13. How do you store DNA samples and profiles?
- ☐ Paper based file
- ☐ Electronic database
- ☐ Both

14. Is there any approved policy or other guideline to govern this lab?
- ☐ Yes (if Y, please note the name)
- ☐ No (if N, please note the reason)

14. Is there any supervisory body to run this lab?
- ☐ Yes (if yes what is the name of the body…………………)
- ☐ No

15. How often does the supervisory body meet in a year?
- ☐ 1 time
- ☐ 2 times
- ☐ 3 times
- ☐ never meet

16. How often do you submit report to the supervisory body in a year?
- ☐ 1 time
- ☐ 2 times
- ☐ 3 times
- ☐ do not submit yearly

17. What kind of assistance do you receive from the funding body (DANIDA)? (if all, Please rank like 1,2,3..according to priority)
- ☐ Financial
- ☐ Technical
- ☐ Training
- ☐ Others

18. The assistance providing by the funding body is adequate?
- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

19. Do you receive any support from the Bangladesh Government to run this lab?
- ☐ Yes
- ☐ No
20. What kind of assistance does Bangladesh Government provide?
☐ Financial  ☐ Technical  ☐ Physical/logistics  ☐ All  ☐ Others

21. The support from the Bangladesh Government is adequate enough to run the lab smoothly?
☐ Strongly Agree  ☐ Agree  ☐ Neutral  ☐ Disagree  ☐ Strongly disagree

22. How long DANIDA will provide support or fund to run this lab?
☐ 0 -1 Year  ☐ 1-2 year  ☐ 2-3 year  ☐ unlimited

23. If DANIDA funding is run out, is there any alternative source of funding for this lab?
☐ Yes  ☐ No

24. In your opinion in which segment / where support need to be increased from all sources?
(You may rank for more options).
1……………………
2……………………
3……………………
4……………………

25. Who are the users/consumers of the Lab service? (Rank on the frequency of service provided)
Judiciary………………
Law enforcing agencies……
Embassy………………
Govt. agencies…………
Private Organizations……
Others…………

26. Can any government authority or funding body access the Lab?
27. The NFDPL is highly significant in the Justice delivery system?
☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

28. The NFDPL is facing challenge to win the public trust about DNA testing?
☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

21. Please list the challenges that this new technology is facing?
   a……………………..   b……………………..
   c……………………..   d……………………..
   e……………………..   f……………………..
   g……………………..   h……………………..

29. General people have lack of information and awareness about DNA test?
☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

30. Is there any development co-operation between Bangladesh and other countries/ international organizations for better management and functioning of lab, other than DANIDA?
☐ Yes ☐ No

31. Do you agree that taking informed consent before collecting DNA sample is necessary?
☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

32. Do you obtain informed consent before collecting DNA sample?
☐ Yes ☐ No

33. DNA sample providers are adequately informed about the sample collection process, analysis, its use and associated risks (if any).
☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree
34. List the information you receive with DNA Sample?

35. How do you store personal information of the sample providers?
   □ Paper based file
   □ Electronic database
   □ Both

36. Do you think the information collected during sample collection is sufficient?
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly disagree

37. Do you cross validate the results with different tests?
   □ Yes □ No

38. The training you received is adequate to learn about new technology?
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly disagree

39. The Lab has adequate safety measures for stored information (e.g. DNA sample, DNA profiles, personal information etc.) against all kinds of threats?
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly disagree

40. Do you think privacy policy is necessary to protect the sophisticated information?
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly disagree

41. Do you have privacy policy?
   □ Yes □ No

Thank you for your co-operation
Case Details

Case no.: 
Police Station: 
District: 
Under section: 
Court: 
Division: 

Nature of Crime

If required, attach separate sheet(s) covering nature, history and other relevant details.

List of Exhibits and Storage Medium being sent for DNA Analysis

If required, attach separate sheet(s) covering nature, history and other relevant details.

Purpose of Examination

Paternity testing
Maternity testing
Identification of individual

Signature, Name and Designation of the Investigating Officer with date & official seal

CERTIFICATE OF AUTHORITY

Certified that the Head, National Forensic DNA Profiling Laboratory (NFDPL), Department of Forensic Medicine, Dhaka Medical College, or his nominee at NFDPL is being authorized to examine the exhibits/material/objects forwarded, pertaining to case no. of PS/Court and to utilize the exhibit fully or partially for the purpose of DNA analysis.

Signature, Name and Designation of the Forwarding Authority with date & official seal
(To whom the report would be sent)

A photocopy of this form may be used if necessary. This form can be obtained from website: www.mspvaw.org
# IDENTIFICATION FORM
[Fill all the columns and whichever is not applicable]

<table>
<thead>
<tr>
<th>Particulars of the donor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Name</td>
<td></td>
</tr>
<tr>
<td>2. Father's/Husband's/Guardian's Name</td>
<td></td>
</tr>
<tr>
<td>3. Mother's Name</td>
<td></td>
</tr>
<tr>
<td>4. Age</td>
<td>Years</td>
</tr>
<tr>
<td>5. Sex</td>
<td>Male [ ] Female [ ]</td>
</tr>
<tr>
<td>6. Address</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blood transfusion within 3 months</th>
<th>Yes [ ] No [ ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of sample collection</td>
<td></td>
</tr>
</tbody>
</table>

**Case details**

<table>
<thead>
<tr>
<th>Case No</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Under section</td>
<td></td>
</tr>
<tr>
<td>Police Station/Court</td>
<td></td>
</tr>
<tr>
<td>Status of the donor in relation to the case</td>
<td>Suspect/Accused/Mother/Child/Putative father</td>
</tr>
</tbody>
</table>

**DECLARATION BY DONOR / GUARDIAN**

I hereby declare that the biological sample is being collected with my consent to NFDPL for DNA analysis and acknowledge the above information is true.

Sample Information: Liquid blood [ ] Buccal swab [ ] FTA card [ ] Others [ ]

Left [ ] Right [ ]

Signature/Thumb impression of the donor/Guardian

Relationship with the donor (if signed by guardian): Father [ ] Mother [ ] Others [ ] Please specify [ ]

**Details of Witness / Solicitor / Investigating Officer**

Signature: [ ] Name: [ ]

Designation: [ ] Address: [ ]

Date: [ ]

NFDPL File No.: [ ] Report No.: [ ]

Sample No.: [ ] Received on: [ ]

Received by: [ ] Assisted by: [ ]

Case assigned to: [ ]

A photocopy of this form may be used if necessary. This form can be obtained from website: www.mspvaw.org